SOUTHERN POWER AND INDUSTRY

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APRIL, 1953

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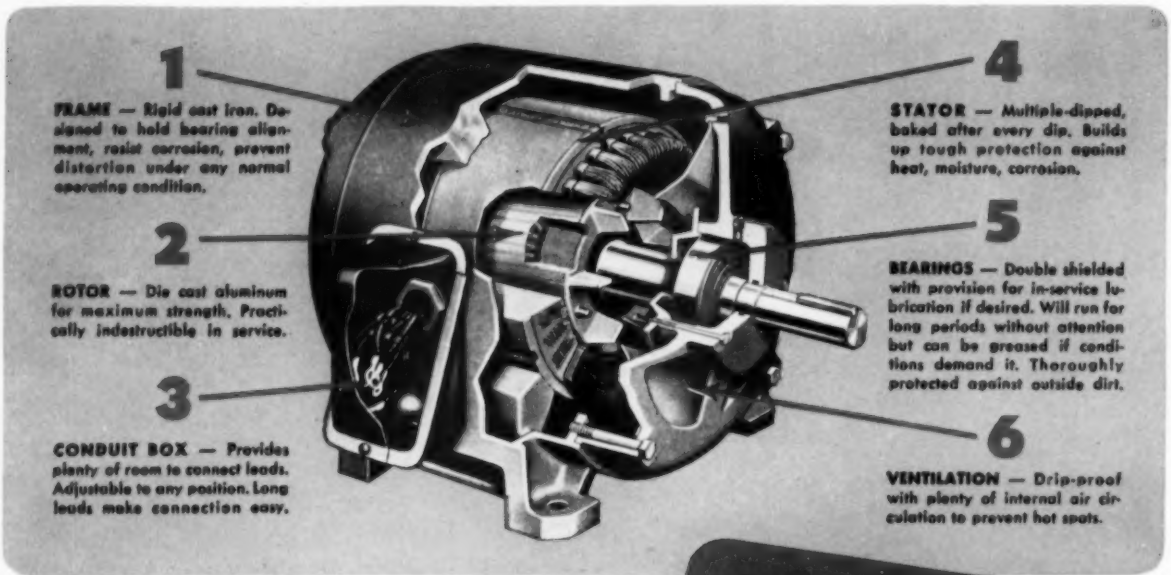
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2
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3
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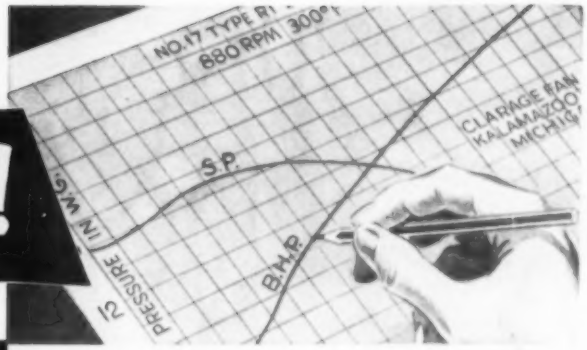
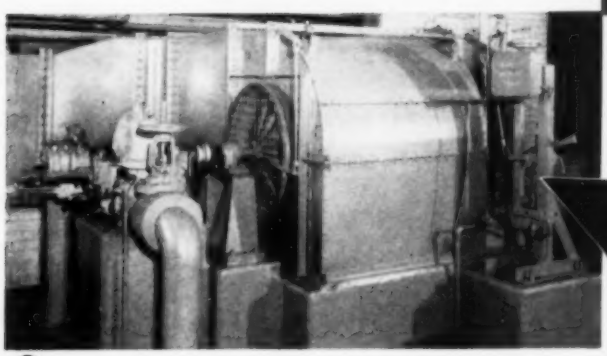
Volume 71 Number 4



figured right!



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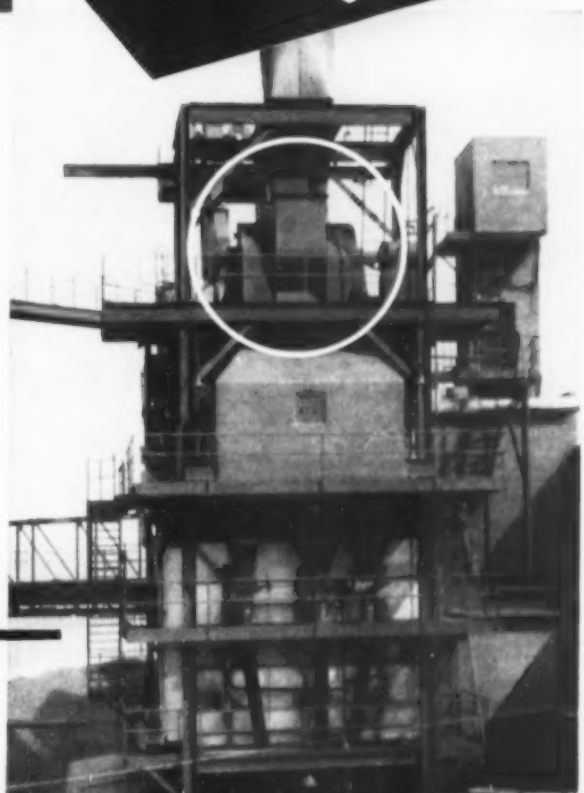

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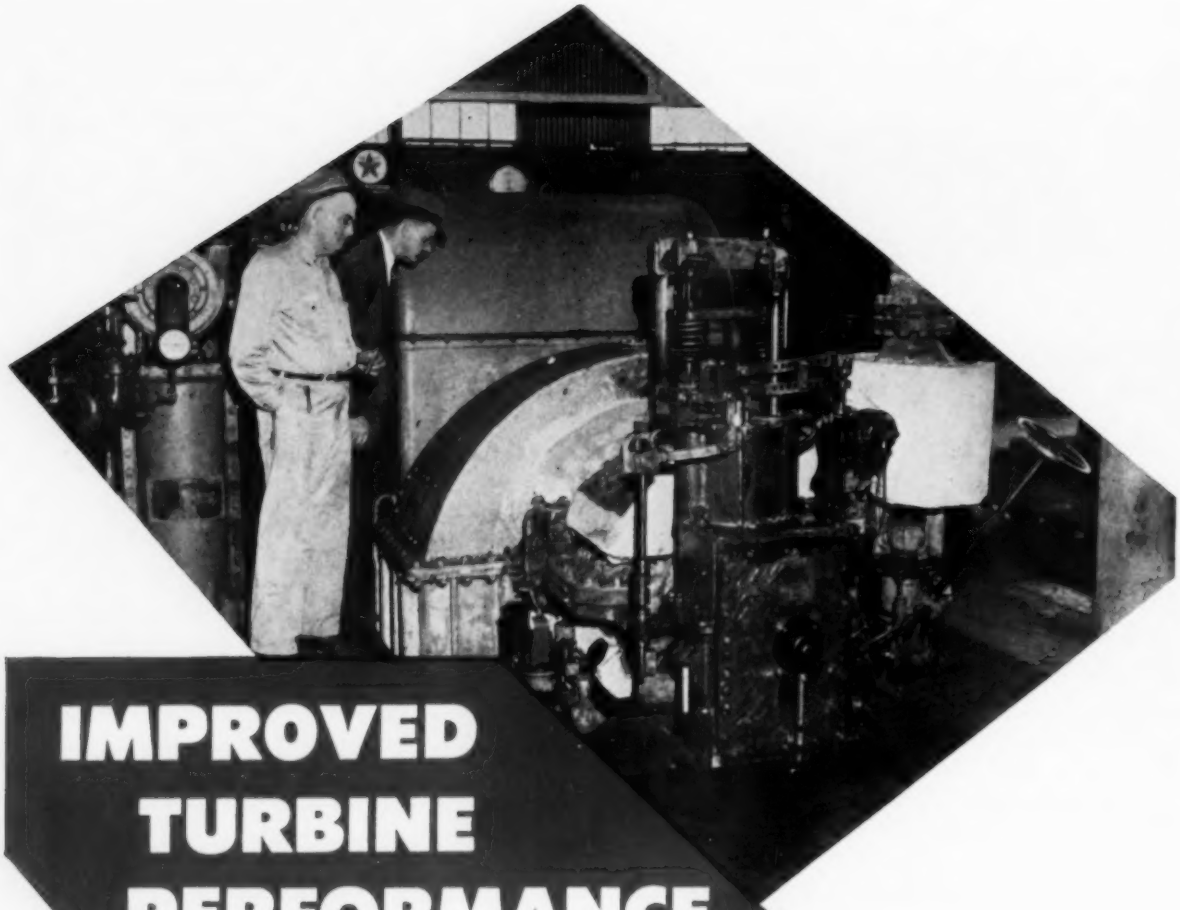

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SOUTHERN POWER AND INDUSTRY

Vol. 71
No. 4

APRIL
1953

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Annual Subscription—$1.00
Foreign—$10.00

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Published monthly by
W. R. C. SMITH PUB. CO.
Atlanta, Ga., and Philadelphia, Pa.

Publishers also of *Textile Industries, Electrical South, Southern Hardware, Southern Automotive Journal, Southern Building Supplies.*

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Contents indexed regularly by Engineering Index, Inc.

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Editorial and Executive Offices: **SOUTHERN POWER & INDUSTRY, 806 PEACHTREE ST., N. E. ATLANTA 5, GEORGIA**

Facts and Trends

FOR SOUTHERN INDUSTRIAL AND POWER EXECUTIVES

April, 1953

► LETTING UNCLE SAM DO IT? Let's get away from that idea. "We must show less eagerness for handouts -- of our money -- from the Federal Government," emphasizes Allan Shivers, Governor of Texas. His excellent comments on "Let's Bring Government Back Home" are featured in this issue.

The new administration has not solved all our problems. The election did accomplish a great deal. It has created an opportunity to stop and perhaps reverse the recent headlong trend toward Big Government. Let's take advantage of it.

Read "Let's Bring Government Back Home" in this issue, formulate your own views and make them known to your congressmen. Just drop us a note for free reprints of Governor Allan Shivers' factual discussion on our opportunity to bring government back home to the states.

► STREAMLINED DRAFTING TECHNIQUES -- General Electric draftsmen are being encouraged to STRIP THE FRILLS from their drawings. Reports indicate a time saving from 20 to 50 per cent. More time is then available for the most important part of any industrial draftsman's job -- productive effort of creative thinking.

Extra views, unnecessary elaboration, superfluous lines, repetition, and conventional representation instead of symbolism are a few of the examples of work that never should have been done. The direct way, the simple way, are encouraged as the best way.

Production and manufacturing personnel are not the least bit interested in fancy drafting technique nor in beautifully executed time-consuming layouts. What they want is complete, concise, accurate information at the proper time. These streamlined techniques will help do the job.

► BASIC CHEMICALS for the new acrylic textile fiber Acrilan are manufactured in Texas. Natural gas and air are combined to form ammonia, then natural gas and ammonia are combined to produce hydrocyanic acid. Natural gas itself is elevated in temperature and pressure to form acetylene. Finally, acetylene and hydrocyanic acid form acrylonitrile.

The liquid acrylonitrile is shipped to the Chemstrand Acrilan plant at Decatur, Alabama, where it is polymerized and reduced to a white powder, having the appearance of talc. Powder is dissolved to form the spinning solution. Forced or extruded through spinnerettes, fiber emerges in the form of continuous filaments which are cut into staple lengths, fluffed or opened, and baled for shipment to textile mills.

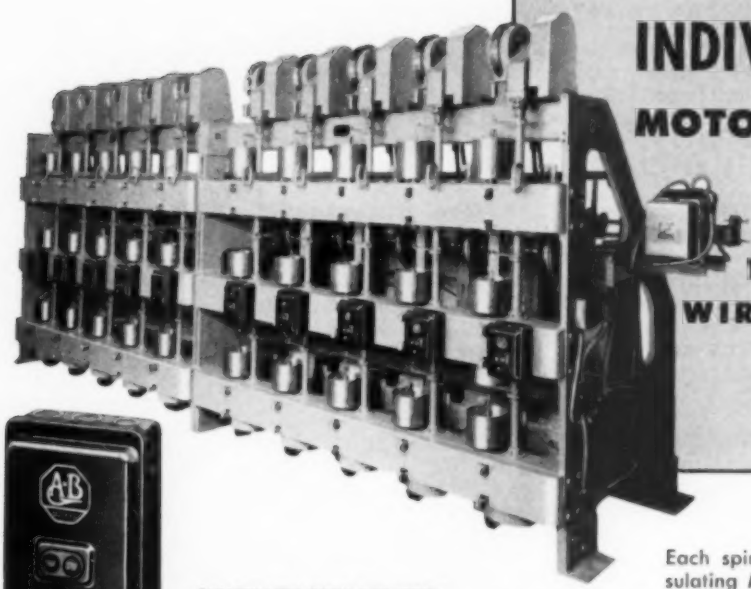
Steam and water are important factors in these processes that produce Acrilan. A complete semi-technical description is featured in this issue of SP&I describing boilers, stokers, draft fans, combustion controls, air compressors, feedwater controls, heat balance control, boiler plant water, softeners, process water, ash and coal handling equipment.

(Continued on page 6)

INDIVIDUALIZED MOTOR STARTERS

for this

10-SPINDLE WIRE INSULATING MACHINE

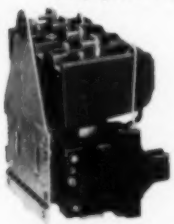


BULLETIN 709 FORM 1 STARTER has start and stop push buttons in cover. Saves space, eliminates conduit and wiring, and makes a neater installation.

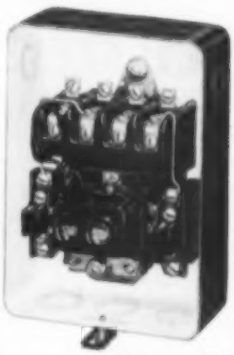
CLOSE-UP OF PUSH BUTTON. Start and stop push buttons are a self-contained unit mounted in a small bakelite housing.

NO CONTACT MAINTENANCE. Allen-Bradley double break, silver alloy contacts are good for long trouble free operation. Never clean, file, or dress them.

DEPENDABLE OVERLOAD RELAYS. A-B thermal overload relays trip automatically and disconnect an overloaded motor. They prevent motor burnouts.



EASY TO INSTALL. Bulletin 709 starters have bonderized cabinets with white interiors that make installation easy in dark corners. Plenty of knockouts, too.



Each spindle of this 10-spindle American Insulating Machine is a separate operating unit . . . with its own motor drive and its own control. By using ten Allen-Bradley Bulletin 709 Form 1 Starters . . . with push buttons in the cover . . . flexible and convenient control is obtained at minimum cost for all spindles.

Since there are no external push buttons, no auxiliary control wiring is needed, which results in a greatly simplified and neater conduit and wiring installation.

Two overload relays in each starter are perpetual watchdogs which will stop the motor, automatically, if an overload occurs.

As for control maintenance, there is none when you install Allen-Bradley solenoid starters with silver alloy contacts. For more details, please write for Bulletin 709.

Allen-Bradley Co., 1328 S. Second St., Milwaukee 4, Wis.

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facts and trends *(continued from page 4)*

► INDUSTRIAL TUBE ANALYZERS are offering a helping hand to industrial plant maintenance personnel. With the extensive and expanding use of electronic equipment in industrial applications, the analyzers fill the need for a simple and reliable means of testing gaseous rectifier tubes periodically to help prevent equipment failure and loss of valuable operating time.

The testers determine the performance characteristics of a wide range of mercury vapor and gas rectifier tubes, measuring the arc drop voltage of tubes at peak emission current to determine their operating condition. For most effective equipment maintenance the tube tester may be used to predict the end life of tubes, so that they may be removed from service before costly work stoppages occur. Case studies from industrial plants in the South and Southwest are scheduled for early publication in SP&I.

► AS LABOR COSTS INCREASE, industrial plants find it necessary to reappraise the relative economy of different type wiring materials. In many cases, materials having higher unit costs may cost less installed if labor time is considerably reduced.

Modernization work in one plant involved the replacement of an obsolete low-voltage system with metal-clad switchgear and radial load-center distribution.

Flexible interlocked armor cable was used for all connections to replace old low-voltage cable and resulted in a saving of tons of copper in addition to greater speed and economy of installation. The cable, unlike conduit, can be easily bent over and under pipes, rafters, and beams. More than 700 ft were pulled into position in 45 minutes.

► WASTE CONTROL TECHNIQUES require company wide cooperation but a successful program will pay big dividends. Utilities, manpower, materials and machinery can be expended uselessly. So...check up now. Utility waste (lights, water, and heat) can never be recovered, so make an attempt to control wasteful practices.

Manpower (lost time and waste of talent) can be easily recognized. Check on misplaced manpower and try testing techniques. Ineffective use and improper location of materials, operation of equipment above and below capacity, misuse, etc., can be corrected by using full capabilities of equipment and establishment of preventive maintenance techniques.

Scrap losses have some salvage value and can be reduced in methods improvement. But particularly watch REJECTED PRODUCTS -- your most expensive waste. Here all elements of production expense are represented in cost of the item rejected. Any slight reduction represents appreciable savings. Check on quality control techniques, diversion into other products and good salvage methods.

► SHOP MAINTENANCE MEN -- Watch for SP&I's big 7th ANNUAL MAINTENANCE ISSUE in May, featuring ideas, kinks, and procedures to reduce maintenance cost, save materials, and improve operation. Tools, devices, equipment and supplies which maintenance crews employ ON THE JOB will be featured plus "plant-tested" maintenance procedures on buildings, piping and valves, refrigeration equipment, engines, pumps, compressors, etc.

Write the editors for additional information on any of the above items. SOUTHERN POWER & INDUSTRY. 806 Peachtree St., N.E. Atlanta 5, Ga.

When Reheat is Considered...

take a close look at this specific Kellogg experience!

To date the company's books show *36* reheat jobs both here and abroad. Some of these have been completed . . . several are underway . . . and others are yet to be started—but they all add up to a major percentage of all reheat systems—including those operating and those to be built.

In addition to this specific experience on complicated reheat jobs, Kellogg approaches each new power piping project with a background that includes the fabrication of piping for scores of main steam installations which are today producing more than 6¼ million KWs . . . and operating at temperatures ranging up to 1050°F . . . and higher. One of the more recent jobs turned out in the Kellogg fabricating shops included the stainless steel main steam piping for a reheat system which will operate at 1100°F and 2350 psig.

The metallurgical "know-how" required to bend this material . . . to weld sections into fault-free sub-assemblies . . . and to accurately heat treat is the result both of experience and specific development work. Kellogg pioneered special welding electrodes and special welding techniques for Stainless 347 . . . and such work is one of the fundamental reasons why Kellogg is specified again and again by important companies for critical power piping jobs all over the world.

These leading companies are among the many major producers of power who use

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- Boston Edison Co.
- Central Hudson Gas & Electric Co.
- Chaudronneries A. F. Smulders (Belgium)
- Compania Argentina De Electricidad
- Compania De Fuerza Del Sarueste De Mexico S.A.
- Consolidated Edison Co. of N. Y.

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The Schori Process Division, Ferro-Co Corporation is a source for both the Fiberglas reinforced plastic sheets and fabricated tanks and ducts.

Reinforced Plastic Ducts

X-1 SCHORI PROCESS DIVISION, FERRO-CO CORPORATION, 8-11 43rd Road, Long Island City 1, N. Y., announces that tanks and ducts are now being fabricated to specifications, without limitation as to size and shape, of Iolyte, a "Fiberglas" reinforced polyester laminate.

No molds are used for the new product, and a number of advantages are claimed: economy of manufacture and faster delivery; chemical-resistant structural plastic, not a coating; no problem of chipping, crazing, cracking, scratching, or other damage that so often impairs the effectiveness of coatings on steel tanks; a "Fiberglas" reinforced polyester laminate, Iolyte withstands higher temperatures than vinyls, rubber, polyethylene, etc.; and although it has the tensile strength of steel, it is only one-fifth its weight. Iolyte tanks are not tapered so that the entire area is available.

Ducts made of Iolyte are easily installed and are especially recommended by manufacturer for corrosive fumes.

Tungsten Alloy Electrode for Inert Gas Welding

X-2 SYLVANIA ELECTRIC PRODUCTS, INC., 60 Boston St., Salem, Mass., has announced a new tungsten zirconium alloy arc welding rod to save time and expense on inert gas welding jobs.

Called "Zirtung," the new electrode features less contamination pick-up on touch starting, continued steady arc and longer working life.

Tips of pure tungsten and thoriated tungsten rods become quickly contaminated. When contamination occurs, welding characteristics are so adversely affected that it is necessary to cut or break off the contaminated tip, thus consuming the electrode. The new rods, however, are said to be the closest commercial approach yet made to a non-consumable electrode. The slight contaminant pick-up and non-wavering arc of Zirtung are claimed to make it ideal for use on all metals, particularly mild steel, aluminum and magnesium where contamination on touch starting is greatest. The new electrode operates on the same current range as thoriated tungsten and contains no radio-active materials.

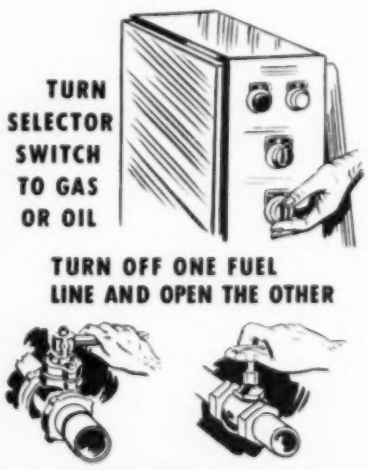
Rapid Changeover in Boiler Firing

X-3 CLEAVER-BROOKS COMPANY, 326 East Keefe Ave., Milwaukee 12, Wis., announces combination gas and/or oil fired boilers which operate on gas with the oil burner in place.

No mechanical or electrical change is necessary to change over from gas to oil and vice versa. Thus, by simply flipping a selector switch on the control panel, to either gas or oil, the proper circuit is set into action. Turning the fuel supply valves completes the entire changeover.

Ten-second conversion, like 4-pass construction, self-contained design and guaranteed 80 per cent efficiency, is another boiler feature introduced by the company to bring steam users greater flexibility at reduced operating costs.

Ten-second gas to oil, or vice-versa, conversion featured by Cleaver-Brooks.



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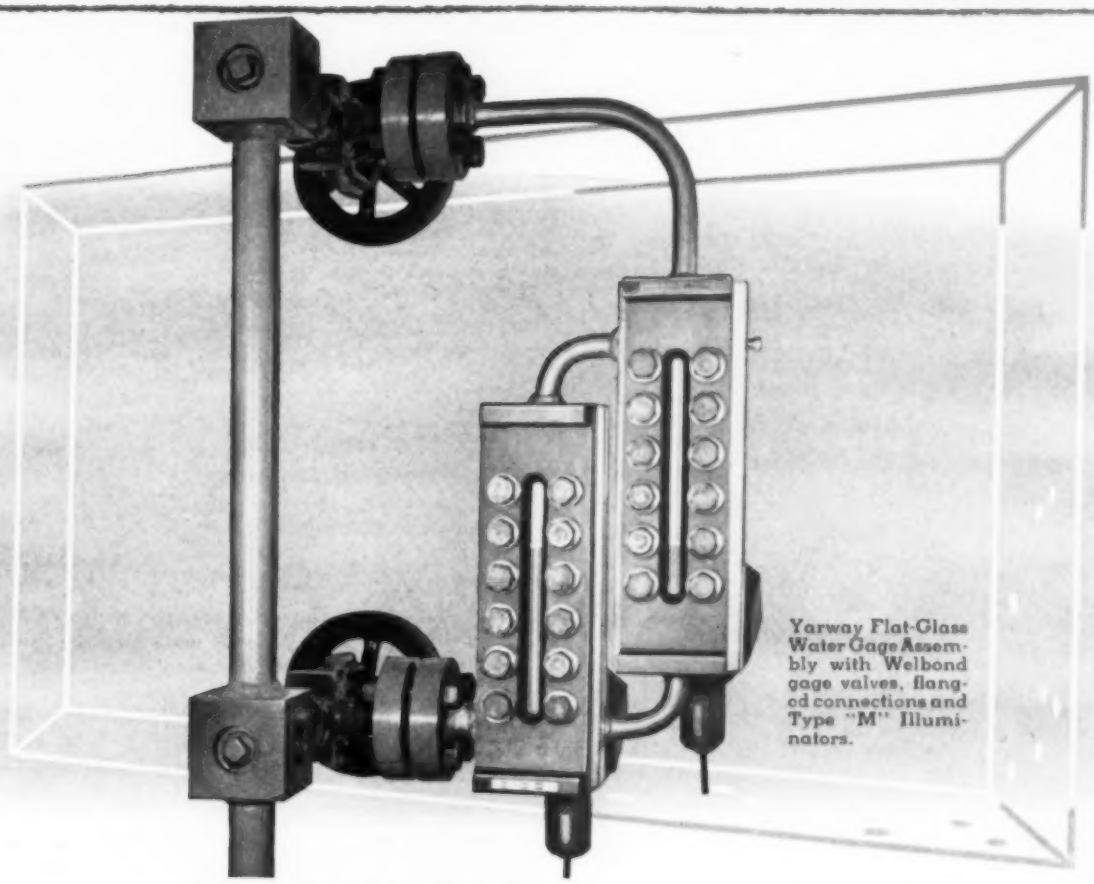
What's New

IN BOILER WATER LEVEL INDICATION?



Yarway Flat-Glass Water Gage Assembly with Welbond gage valves, flanged connections and Type "M" Illuminators.

NEW *SEPARATED-DESIGN* WATER GAGES

This new Yarway water gage assembly has been developed to meet the demands for greater dependability, longer life, and more accurate readings in high pressure service.

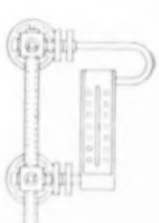
The gage glass inserts are of the Yarway pressure-sealed "floating assembly type". Yarway Welbond gage valves are used. Greater flexibility is gained by using two independent inserts, and by interconnecting expansion loops (see above).

The short connection to the drum assures greater accuracy of the gage reading, and the lower flanged connection eliminates a stuffing box. The upper flanged loop connection between the insert and gage valve allows expansion and contraction of the various components.

The tie bar-type water column linking the gage valves provides circulation to keep gage nearer drum temperature.

Yarway Type "M" Illuminators on the gage inserts cause the meniscus at water level to "shine like a star". This illuminator is especially effective in penetrating deposits on gage glass, dust particles in air and extraneous light.

For full information, write for Yarway Bulletin WG-1811.



Yarway Single Insert type gage for medium range of visibilities.

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YARWAY® STEAM PLANT EQUIPMENT

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

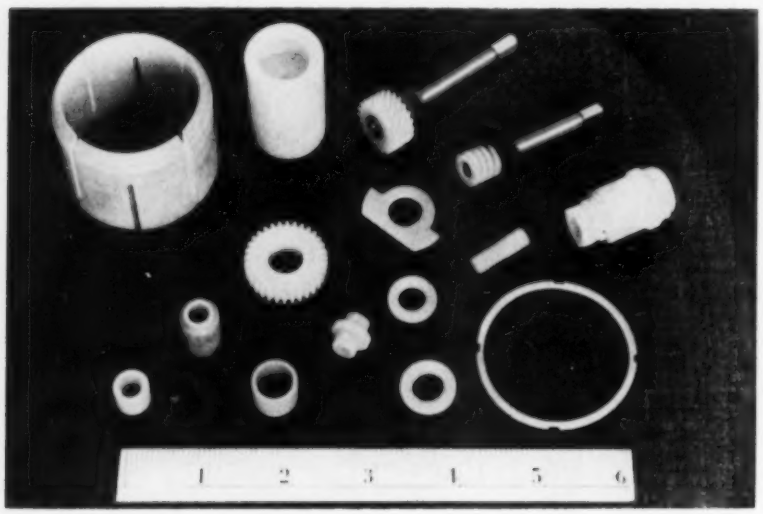
Machined Nylon Parts for Equipment Maintenance

X-4 THE POLYMER CORPORATION OF PENNSYLVANIA, Reading, Pa., suppliers of nylon and Teflon rod, strip, tubing and slabs, announces that an increasing amount of nylon is being fabricated by machining, blanking, forming, and stamping into gaskets, bushings, bearings, screws, gears, valve seats, rollers, and other machine and equipment parts.

Advantages of nylon for repairs and maintenance are its light weight, abrasion resistance, long life, quietness in operation and corrosion resistance. Another advantage is its short time resistance to high temperatures such as those encountered in soldering.

Customers using nylon parts in place of metal for replacement and repair report that nylon gives them low tooling cost, design flexibility, close tolerances and low cost pilot runs.

The nylon formulation most often supplied by the Polymer Corporation for industrial plant maintenance machinery operations is grade FM10001. When used for bearings, gears, thrust washers, and other moving parts, the formulation operates continuously for long periods with little or no lubrication, thus reducing wear and maintenance costs.

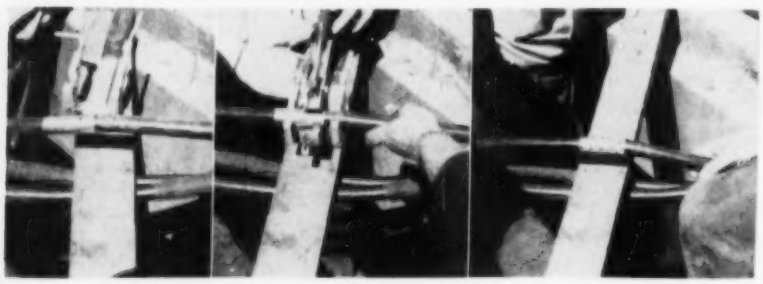


Electrical Connectors and Installation Tools

X-5 THE F. M. ANTHONY COMPANY, 2022 Oakland Avenue, Piedmont 11, Calif., is now manufacturing and marketing a new line of electrical splicing connectors, terminal lugs, rubber and Neoprene insulating sleeves, and crimping tools under the name of Insul-Lock.

Feature of the new line is the single mechanical type portable hand crimping tool illustrated. It is easily operated in a restricted space and is ideal for use in steel mills, mines (single and multiple conductor cable), railroad shops, and other general industrial plants. In addition to the portable tool there is available a line of bench tools for shop use.

Feature of the F. M. Anthony Company line is a single mechanical type portable hand crimping tool which makes a full circumferential crimp and will crimp a range of wire and cable sizes from #4 up through 500 MCM without the changing of dies or application of heat. Tool is light (2¾ lb) and is simple to operate. It works on a ratchet principle and rolls a crimp into the connectors and lugs.



For welding cable, the company markets in addition to connectors and lugs pre-molded rubber and Neoprene insulating sleeves which can be put on over the splicing connectors with a special mounting tool. This method saves time over conventional taping and affords a "permanent" job.

All Insul-Lock terminal lugs and splicing connectors fit the conductor perfectly and have greater area in circular mils than the cables for which they are designed. This means that under the same conditions, the Insul-Lock connectors have greater electrical carrying capacity than the same size cable.

Centrifugal Fan Design

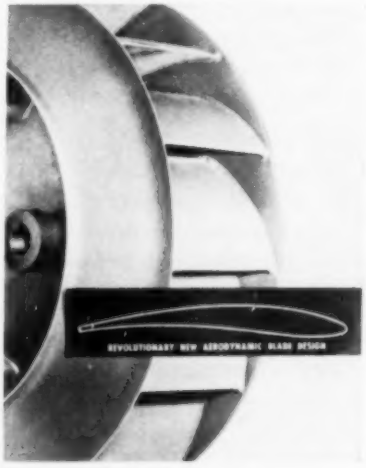
X-6 CHICAGO BLOWER CORPORATION, 9869 Pacific Ave., Franklin Park, Ill., has developed an improved type of centrifugal fan.

The fan wheel is of the backward curve type with airfoil hollow sectioned blades, which conform to the same aerodynamic principles used on modern aircraft to provide greatest volume and smoothest air flow possible at an unmatched noise level. Operation efficiency is said to exceed 90 per cent. Both wheel and housing are of all-welded heavy gauge steel plate construction.

Specifications include air deliveries of 600 to 750,000 cfm ⅛ in. to 16 in. static pressures; wheels 12¼ in. to 132 in. diameter; Class 1 to 4 construction.

The fan is applicable for use in industrial plants, heating, ventilating, and air conditioning systems.

Chicago Blower's fan blade design. Details in company's Bulletin A-101.



New Equipment and Supplies Continued on page 126

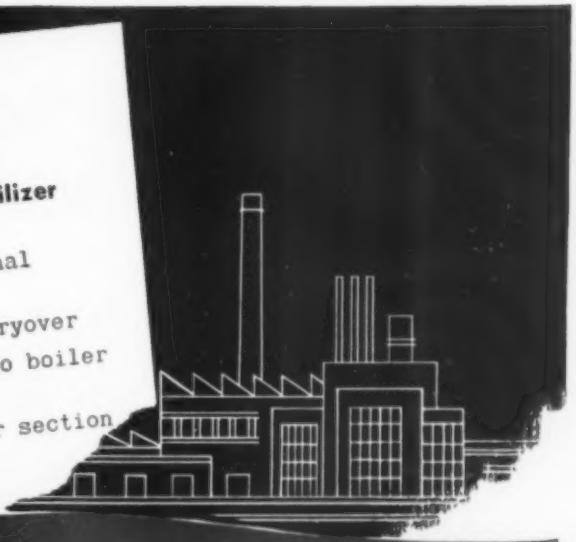
DREW TECHNICAL BULLETIN

DREW ORGANIC U-14-L

Antifoam, Sludge Conditioner and Stabilizer

Used in conjunction with conventional inorganic water treatment to:

a) Provide protection against carryover
b) Prevent sludge from adhering to boiler metal surfaces
c) Prevent deposits in pre-boiler section



DREW ANTIFOAM PREVENTS CARRYOVER

Anything other than dry steam going over from the boiler may lead to difficulties in boiler water systems. Drew Boiler Water Treatment includes highly effective products such as Drew Organic U-14-L for prevention of carryover.

A large food manufacturer in the mid-west was troubled with excessive carryover. Drew Organic U-14-L was recommended after a thorough analysis. It not only stopped the carryover, but also cleared up sludge adherence, which had long been a problem.

To prevent or eliminate industrial water problems in your plant, you'll get results faster and more economically with this Drew program:

1. Thorough study and analysis of the problem
2. Use of effective organic and inorganic products
3. Efficient methods of feeding products to the system
4. Control of dosages by simplified plant testing
5. Service by qualified field engineers
6. Technical assistance by the Drew Technical Department

Write for booklet "Drew Organics" and technical bulletins.

Power Chemicals Division

E. F. DREW & CO., INC.

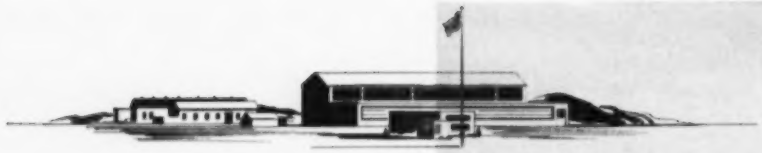
15 East 26th Street, New York 10, N. Y.

AJAX, ONTARIO

SAN FRANCISCO CHICAGO PHILADELPHIA BOSTON DALLAS ASHEVILLE, N. C.

Service throughout the United States, Canada and South America

DREW PRODUCTS



From B&W Research and Development . . .

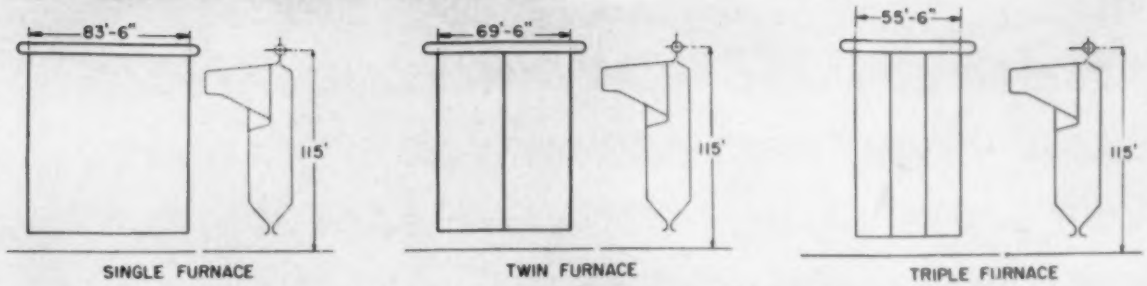
a practical solution to cost problems...

B&W DIVIDED

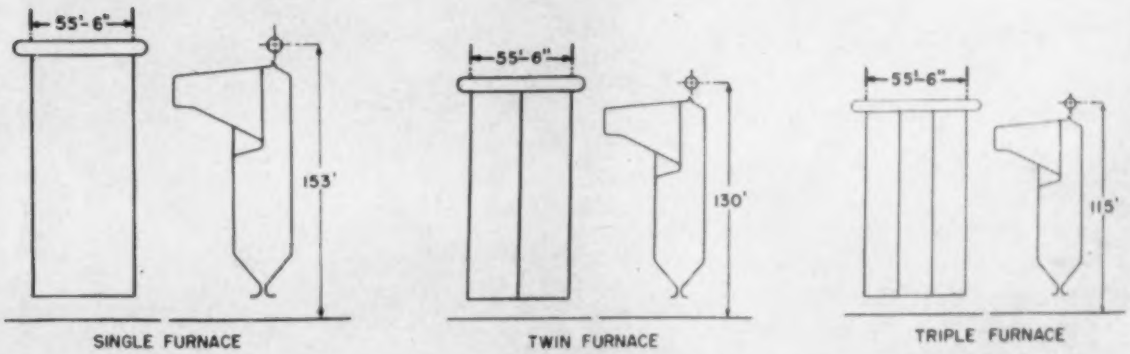
A practical, long-proved solution to rising construction costs may be found in the B&W Divided-Furnace Boiler. Whether it is a problem of conserving height, width, or both—especially for units with large heat input—B&W's Divided-Furnace design offers remarkable economies. The sketches on the opposite page show typical savings in space for twin-furnace and triple-furnace construction as compared with single-furnace construction.

A furnace division wall receives heat from both sides and therefore must be assured an adequate supply of water. With the B&W Cyclone-Steam Separator, circulation in division walls of B&W boilers has always been more than ample—as proved by long-term central station operation at boiler design pressures as high as 2650 psi. Many years of experience stand behind B&W's Divided-Furnace construction with all types of large units—Radiant, Stirling, and Open-Pass. Over 75 B&W Divided-Furnace Boilers are in operation—many for over 10 years—and more than 80 units are under construction, for the following electric utilities:

Alabama Power Company • Appalachian Electric Power Company • Arkansas Power & Light Company • Cincinnati Gas & Electric Company • City of Los Angeles • Cleveland Electric Illuminating Company • Commonwealth Edison Company • Consolidated Edison Company of N. Y. Inc. • Consolidated Gas, Electric Light & Power Company of Baltimore • Dallas Power & Light Company • Detroit Edison Company • Duquesne Light Company • Electricite France • Georgia Power Company • Houston Lighting & Power Company • Indiana & Michigan Electric Company • Jersey Central Power & Light Company • Kentucky Utilities Company • Long Island Lighting Company • Middle South Utilities, Inc. • Monongahela Power Company • Niagara-Mohawk Power Corp. • Northern Indiana Public Service Company • Ohio Edison Company • Ohio Power Company • Pacific Gas & Electric Company • Pennsylvania Electric Company • Philadelphia Electric Company • Public Service Company of Colorado • Public Service Company of Northern Illinois • Public Service Company of Indiana Inc. • Public Service Company of Oklahoma • Public Service Electric & Gas Company • Southern California Edison Company • Tennessee Valley Authority • Texas Electric Service Company • Texas Power & Light Company • Toledo Edison Corp. • Union Electric Company • West Penn Power Company • Wisconsin Power & Light Company



EFFECT OF DIVISION WALLS ON BOILER WIDTH—KEEPING HEIGHT CONSTANT



EFFECT OF DIVISION WALLS ON BOILER HEIGHT—KEEPING WIDTH CONSTANT

FURNACE

Division wall furnace construction is used in combination with other significant achievements of B&W Research and Development, including the Cyclone Furnace, Pressure-Firing, Gas Recirculation, and improved alloys for high steam temperatures. Widely accepted throughout the power industry, these modern B&W advances are making major contributions to more economical and reliable steam generation.

B&W's continuing program of progressive research combined with its broad experience in designing and building boilers with the highest capacities in existing pressure-temperature ranges, assure you of the most efficient and economical solutions to your specific steam generation problems.

ADVANTAGES OF DIVIDED FURNACE CONSTRUCTION

- Provides greater cooling area without increasing furnace volume
- Reduces steel and other material costs by keeping boiler and building volume to a minimum
- Lowers furnace construction costs
- Cuts operating costs by reducing slagging in furnace and in convection surface

Triple furnace boilers for 1 boiler—1 turbine units of over 200,000 KW capacity are now being constructed

BABCOCK & WILCOX

G-5691

"WE TRIED FUSETRON DUAL-ELEMENT FUSES ON OUR CRANE MOTOR CIRCUITS . . . THEY REDUCED FUSE BLOWS FROM FOUR OR FIVE A DAY TO ONLY THREE IN SEVEN MONTHS"

Chas. A. Gardner, *Chief Electrician,*
Nicholson Terminal & Dock
Ecorse, Detroit, Michigan

PROBLEM

"We have many overhead cranes that operate on 24 hour schedules. The severe service to which these cranes are put when loading and unloading ships throws a tough load on the motors. This was causing us a lot of grief due to fuses blowing 4 or 5 times a day. Each blow caused a shutdown that stopped work and made men idle.

SOLUTION

"In testing Fusetron fuses to see if they would help us, we selected a certain crane and inserted Fusetron fuses in that circuit for one 8 hour shift. At the end of the shift we would replace the Fusetron fuses with the ordinary renewable fuses we had formerly used. Then we compared the down time of the crane due to fuse blows.

"To be sure the fuse blows weren't due to the operator, we changed around and would run the Fusetron fuses on two shifts and the old fuses on one.

"The results, however, always came out the same. The Fusetron fuses would stand up under the hard service — and the ordinary fuses would not.

"As a result of these tests we changed all fuses on our crane circuits to Fusetron fuses.

"That was last October, seven months ago, and to date we have had only 3 shutdowns of our cranes due to fuses blowing."

Don't Risk Losses

One **needless** shutdown . . .
One **lost** motor . . .
One **destroyed** switch or panel
One **burned out** solenoid . . .

May cost you far more than replacing every ordinary fuse with a Fusetron dual-element Fuse.

FUSETRON dual-element FUSES Protect Production *10* Ways

1 *Protect against short-circuits.

2 Protect against needless blows caused by harmless overloads.

3 Protect against needless blows caused by excessive heating—lesser resistance results in cooler operation.

4 Provide thermal protection—for panels and switches against damage from heating due to poor contact.

5 Protect motors against burnout from overloading.

6 Protect motors against burnout due to single phasing.

7 Give DOUBLE burnout protection to large motors — without extra cost.

8 Make protection of small motors simple and inexpensive.

9 Protect against waste of space and money — permit use of proper size switches and panels.

10 Protect coils, transformers and solenoids against burnout.

*Fusetron Fuses have high interrupting capacity as shown by tests of the Electrical Testing Laboratories of New York.

HERE'S WHY...

A fuse link combined with a thermal cutout — the result, a fuse with tremendous time-lag and much less electrical resistance.

They have the same degree of Underwriters Laboratories approval for both motor-running and circuit protection as the most expensive devices made.

Made to same dimensions as ordinary fuses, FUSETRON FUSES fit all standard fuse holders.

Obtainable in all sizes from 1/10 to 600 ampere, both 250 and 600 volt types. Also in plug types for 125 volt circuits.

Their cost is surprisingly low.

FUSETRON is a trade mark of the Bussmann Mfg. Co.

Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo. (Division of McGraw Electric Co.)

Please send me complete facts about FUSETRON dual-element fuses.

Name_____

Title_____

Company _____

Address _____

City & Zone_____ State_____ 353

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30 **STEAM GENERATORS** — Catalog 1218—Describes packaged units 15 to 500 hp. Gives construction details of models for single or multiple fuel firing.—ORR & SEMBOWER, INC.

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INSTRUMENTS—METERS CONTROLS—REGULATORS

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Equipment and Review Editor
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4-53-1

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530	534	545	558	611	638	643	644	645	705	734	760	768	780	805	807
820	828	871	906	921	960	969	992	P1	P2	P3	P4	P5	P6	P7	P8
P9	P10	P11	P12	P13	P14	P15	P16	P17	P18	P19	P20				

Also send further information on following New Equipment (page 8)

X1 X2 X3 X4 X5 X6 X7 X8 X9 X10 X11 X12 X13 X14 X15 X16 X17 X18

Name ..... Position .....

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638 **FLEXIBLE COUPLINGS**—Bulletin 2300, 4 pages—Describes DeLaval crown couplings, including complete information on construction, ratings, speeds, applications and selections. Illustrated with line diagrams and photographs.—DeLAVAL STEAM TURBINE CO.

643 **AUTOMATIC MONORAIL TRANSPORTATION**—Bulletin AD-1A, 12 pages—Describes a complete range of automatic dispatch monorail systems for transfer of materials by remote control.—AMERICAN MONORAIL CO.

644 **COAL HANDLING**—Book 2354, 28 pages—"Scientific Coal Preparation Methods and Equipment," gives installation views, flow diagrams, typical applications of low cost handling and better preparation of coal at the mine.—LINK-BELT CO.

645 **PRECISION GEARS** — Folder, 4 pages—"Gear Errors are Costly"—Discusses incorrect gear designs and speeds, and suggests methods of elimination of gear errors so as to improve production. Illustrates with plant photographs, actual installations, and results. — SIER-BATH GEAR AND PUMP CO.

WATER TREATMENT, HEATING, VENTILATING, AIR CONDITIONING, REFRIGERATION, DUST & FUME CONTROL

705 **EXHAUST AND VENTILATING FANS**—Bulletin D-56—Exhaust and ventilating manual describing the application and performance of Emerson electric ventilating equipment. — THE EMERSON ELECTRIC MFG. CO.

734 **ROOF COOLING SYSTEMS**—Bulletin 99 and Supplement 99A—Describes how Watco roof-cooling systems reduce inside temperatures 10 to 30 degrees—giving greater comfort, better working conditions, and higher efficiency to workers during periods of warm and changeable weather—installed by contract or by plant personnel.—WATER COOLING CORP.

760 **CENTRIFUGAL REFRIGERATION** —Bulletin C-100-B-14 — Describes Worthington centrifugal refrigeration systems—cycles of operation, refrigerants, compressor design features, condensers, evaporators, controls, drives, etc.—WORTHINGTON CORPORATION.

788 **STEAM HUMIDIFIER** — Bulletin 1774 describes a complete line of steam humidifiers, including two new air controlled models. Discusses dry air problems, gives tables on desirable relative humidities and the regain of hygroscopic materials. Complete data on operation and installation. — ARMSTRONG MACHINE WORKS.

780 **DEMINERALIZATION AND SILICA REMOVAL**—Bulletin 2505—Describes the various arrangements of cation and anion exchange equipment for demineralising raw water economically. Also describes effective cation and anion exchangers. —THE PERMUTIT CO.

ELECTRICAL

805 **COUPLING CAPACITORS FOR CARRIER CURRENT SYSTEMS**—Bulletin 306—Describes Sprague capacitors for coupling radio frequency systems to electric power distribution lines in telephone communication, in remote switching, in telemetering, in fault detecting and other carrier current uses.—SPRAGUE ELECTRIC CO.

807 **ELECTRONICS COMMUNICATION SYSTEM**—Catalog—Describes a high and low level voice plant communication system—public address, operational intercommunication, amplified party-line telephone, all provided in one complete system. —GAI-TRONICS CORPORATION.

820 **MOTOR CONTROL UNITS**—Bulletin 800-T—Describes oil tight solenoid motor controlled units for machine tools and similar equipment with various accessory equipment to fit the particular job.—ALLEN-BRADLEY CO.

828 **ELECTRIC TRANSFORMERS** — Bulletins TU-13 and TU-56—Describe the design and construction features that make Wagner liquid filled and dry type unit sub-station transformers outstanding—can be connected to any make of switchgear.—WAGNER ELECTRIC CORPORATION.

871 **ELECTRICAL PROTECTION**—Protection Handbook—Tells how to protect motors, apparatus and circuits. Gives National Electrical Code requirements in simplified form. Designed to help the electrical or plant maintenance engineer.—HUBBMANN MFG. CO.

MISCELLANEOUS . . . SAFETY, BUILDING EQUIPMENT, METALS

908 **INDUSTRIAL DUST COLLECTOR** — Catalog 101 — Describes the Aerotec industrial dust collector, available in self-contained, custom-built industrial assemblies which may be adapted as integral parts of existing equipment, with tube performance records given on eight representative dusts.—THERMIX ENGINEERING CO.

921 **VACUUM CLEANING**—Form A-700, 16 page booklet, describes the greater plant cleanliness, safety and productivity gained through the use of Hoffman heavy duty vacuum cleaning. Applications and installations illustrated.—U. S. HOFFMAN MACHINERY CORP.

960 **UNIT HEATERS**—Thermoiler Catalog—Describes the important features of Thermoiler unit heating, an economical method of adequate plant heating. —GRINNELL CO., INC.

969 **INSULATING BRICK** — Brochure IN-115-A—Describes the construction, application and use of insulating firebrick, including insulating brick, hydraulic —setting refractories, aggregates and fills— for service temperatures up to 3000° F.— JOHNS-MANVILLE CORP.

992 **FIRE PROTECTION**—Bulletin 2319 describes Blaw-Knox Deluge systems, wet and dry pipe sprinkler systems, water spray and fog systems, rate-of-rise sprinkler systems, etc., and indicates how a sprinkler system pays for itself out of insurance savings.—BLAW-KNOX SPRINKLER DIV., BLAW-KNOX CONSTRUCTION CO.

Continued on page 134

4-53-F

Please send me without obligation, free booklets described in the April, 1953, issue of SOUTHERN POWER AND INDUSTRY as circled below:

18	30	32	34	45	47	48	49	51	54	83	85	96	103	127	132
142	159	163	195	206	219	224	230	261	274	300	312	329	335	342	350
351	355	387	403	404	435	443	458	459	460	473	486	525	527	528	529
530	534	545	558	611	638	643	644	645	705	734	760	768	780	805	807
820	828	871	906	921	960	969	992	P1	P2	P3	P4	P5	P6	P7	P8
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806 Peachtree St., N. E.
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List Items You Want, Tear Out and Mail One of the Attached Cards Now!

Please be sure to fill in your Firm's Name and your position on the Coupon. This service cannot be extended to you unless this information is furnished.

WHY you can depend on GRINNELL PIPE FITTINGS to suit you to a

Superior Quality, Complete Line, Available Coast-to-Coast

The finest materials, equipment and methods are employed in the manufacture of the *complete line* of high quality Grinnell malleable iron and cast iron pipe fittings. Branch warehouses and distributors, located from coast-to-coast, make local stocks as convenient as your telephone.

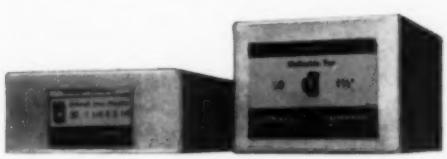
The same can be said about superior quality and ready availability of Grinnell Steel Nipples. Top grade, new pipe only is used. Controlled manufacture assures accurate chamfer for quick starting; precision threads for easy running-up and tight joints.

GRINNELL FITTINGS — Mass-produced by skilled workers using modern equipment.

GRINNELL NIPPLES — Precision machines produce accurate threads and proper chamfer.

PACKED IN CARTONS — You are assured easier handling, storage and identification.

When Ordering, Specify Grinnell Malleable Fittings and Steel Pipe Nipples *in cartons* . . .



Both Grinnell malleable iron fittings and steel nipples are available in cartons.* On the shelf or on the job, *cartoned* fittings and nipples offer a number of advantages, at no extra charge:

- Faster and cleaner handling
- Cleaner stocks for resale and use
- Threads protected against damage
- Simplified storage and shipping
- Contents quickly identified by labels
- Greater accuracy in filling orders

***Grinnell Malleable fittings also come in small and large bags.**

Call Your Local Grinnell Distributor

Grinnell Company, Inc., Providence, Rhode Island • **Coast-to-Coast Network of Branch Warehouses and Distributors**

Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

Carroll Station Installs Conseco Non-Divided Flow Condenser

"CONSECO 6500 Sq. Ft., Two Pass, Non-Divided Flow Condenser, with bath type hot well and spring supports, installed in the recently opened . . . Carroll Station of the Iowa Public Service Company. Features of this Condenser are outside steam belt, deep water box and quick opening doors in channel covers. Also furnished with this equipment is CONSECO Twin Element, Two Stage Air Ejector. Auxiliaries include Condensate Pumps and Atmospheric Relief Valve."

***CONSULT CONSECO ENGINEERS** about your condenser and feedwater heater needs. They will be glad to tell about the advanced features which assure trouble-free, low cost performance in your plant*

CONSECO

CONSECO LINE includes: BOILERS • CONDENSERS • STEAM AIR JET EJECTORS • DEAERATORS • CLOSED HEATERS

CONSECO

CONDENSER SERVICE & ENGINEERING CO.

HOBOKEN, NEW JERSEY

Fig. 6003 W. E. 600-pound Cast Steel O. S. & Y. Gate Valve with welding ends.

The name "POWELL" on a valve assures absolute dependability

Naturally, in buying a valve, the first consideration is its ability to perform a specific service. But that is not all. For it must also be a valve that will continue to function dependably for a long time. Powell Valves have an established reputation for this dependability.

The Wm. Powell Company
Cincinnati 22, Ohio

POWELL

DEPENDABLE VALVES SINCE 1846

**BRONZE,
IRON, STEEL AND
CORROSION-RESISTING VALVES**

They

KEEP PLANTS RUNNING!

Bunting Precision Bronze Bars

Protection against shut-downs is constantly provided, right in your own community, by your Bunting Distributor and Bunting Precision Bronze Bars. Factory machined on all surfaces, Bunting Bronze Bars save you 25% of purchased metal, 50% of machining time and wear on costly tools.

The Bunting Distributor

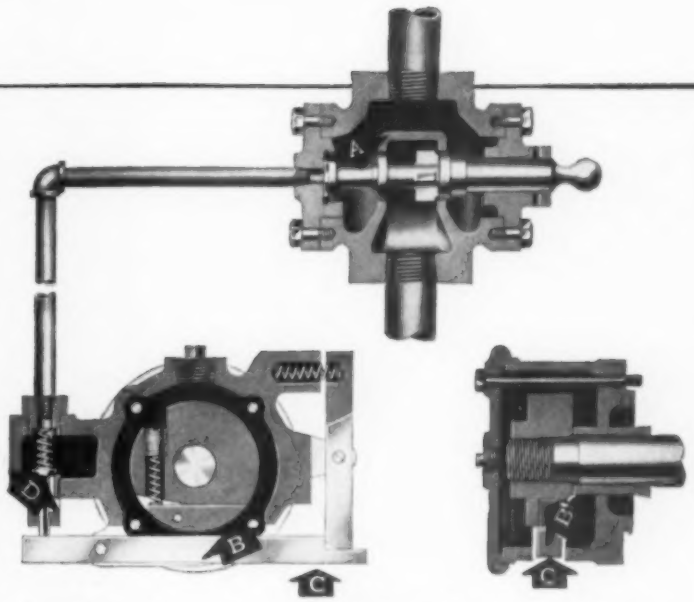
Your Bunting Distributor is an industrial distributor or a specialist in certain industrial items. You will find him listed in the classified section of your telephone book—most likely under the heading Bars, bronze or Bearings, bronze. If he is the leading distributor, he almost certainly is the Bunting Distributor. He carries in stock, for your money saving convenience, completely machined and finished Bunting Standard Stock Industrial Bearings, Electric Motor Bearings and Precision Bronze Bars in a complete range of sizes meeting all your usual production and maintenance needs. Ask him for catalog.

Bunting®

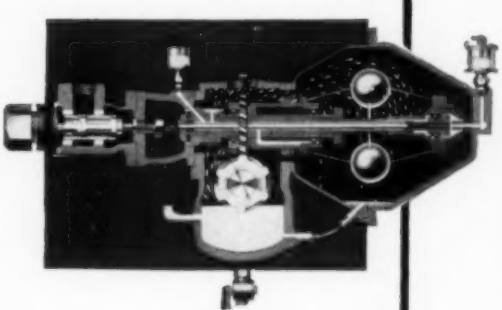
BRONZE BEARINGS • BUSHINGS • PRECISION BRONZE BARS

THE BUNTING BRASS & BRONZE COMPANY • TOLEDO 1, OHIO • BRANCHES IN PRINCIPAL CITIES

Only Coppus Turbines offer you *a pilot operated* excess speed safety trip



The constant speed governor on Coppus Turbines, plus this Excess Speed Safety Trip, gives you extra protection for your turbine investments. Here's how it works. When steam is turned on, pressure opens valve A fully. When excess speed is reached, centrifugal force throws weight B against lever C lifting pilot valve D. This releases pressure in back of valve A, closing this valve instantaneously, to shut off the steam. Safety trip can be tested easily while turbine is running by manually tripping and resetting lever C.



Sectional view showing lubricating system of fully enclosed Coppus Constant Speed Governor. Governor head acts directly on stem of steam admission valve. No external levers required. Ball bearing construction eliminates end play and gives frictionless operation.

Coppus Turbines ranging from 150 hp down to fractional in 6 frame sizes

CUT YOUR COSTS PER HORSEPOWER

When you choose from the Coppus Steam Turbine line, you get the right size for your requirements . . . and make substantial savings on *any* size from the 150 hp turbine down to the smallest. Low in first cost, Coppus Turbines save you more money in the long run. Operating and maintenance costs are kept low by such other features as: large number of steam nozzles, controlled individually by manually operated valves; hard chromium plating on shaft at the stuffing box; replaceable cartridge type bearing housings; optional carbon ring packing assembly for back pressures up to 75 pounds.

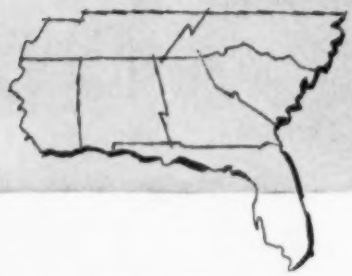
WRITE FOR BULLETIN 135

COPPUS ENGINEERING CORPORATION, 244 Park Ave., Worcester 2, Mass. Sales offices in THOMAS' REGISTER.

COPPUS "BLUE RIBBON" TURBINES

Meet Jim Evans -

your new Cambridge Field Engineer in the industrial southeast



He'll fly the CambriPlane!

Now you can get immediate factory service and engineering assistance —from Jim Evans *flying his own company plane,* the CambriPlane, on installation and use of these nationally-known Cambridge products:

WIRE MESH CONVEYOR BELTS for combining movement with processing in food, metalworking, ceramic and chemical plants.

FABRICATED ALLOYS . . . crates, baskets, racks, trays for bulk handling during processing.

INDUSTRIAL WIRE CLOTH for filtration, screening, sizing, etc. . . . in bulk or fabricated parts . . . from 20 x 250 mesh up to 4" openings.

GRIPPER WOVEN WIRE SLINGS for handling any size, shape or weight load anywhere in your plant.

Jim Evans, your Cambridge Field Engineer in this newly opened territory, operates from 333 Candler Building, Atlanta, Georgia. Call him in whenever you want information or advice on Cambridge products. Remember, he flies a company plane to give you fastest service!

FREE REFERENCE MANUALS

To help acquaint you with our products and their uses, we would like to send you FREE copies of our reference catalogs.

WIRE MESH BELTS

140 pages of useful data on conveyor and conveyor belt design, uses, specifications; also valuable metallurgical data.

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Complete information on Cambridge wire cloth, including full range of specifications ... also facilities for fabricating alloy parts.

GRIPPER SLINGS

Gives sling construction details, shows uses, range of sizes and specifications.

... Write for your copies TODAY!

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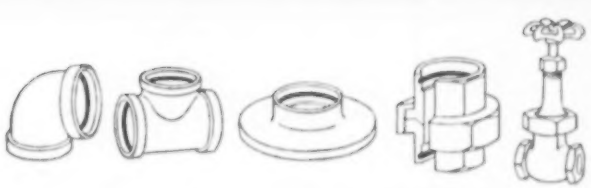
OFFICES IN PRINCIPAL INDUSTRIAL CITIES

WALSEAL®

COMPLETE LINES OF WALSEAL VALVES AND FITTINGS

WALSEAL is a smooth-bore, bronze valve or pipe fitting having a **factory-inserted** ring of silver brazing alloy in the outlet or outlets. The brazed joint that results when a Walseal product is installed is leakproof, vibration-proof, and corrosion resistant. The alloy fillet that appears upon completion of the joint is visual assurance of **full penetration of alloy.** This improved method of joining brass, copper, or copper-nickel pipe or tube is another Walworth contribution to the progress of the valve and fittings industries.

In addition to its complete line of Walseal products, the Walworth Company manufactures complete lines of valves, fittings, unions, and flanges in a wide range of sizes and temperature-pressure ratings. The company also makes three lines of pipe wrenches, the Genuine Stillson, Walco, and Parmelee. Walworth products total approximately 50,000 items and are sold through distributors or agents in all parts of the world.



The sectioned Walseal tee illustrated, shows: (a) the fillet of alloy that appears upon completion of the Walseal joint. This fillet is your visual assurance of complete penetration. (b) the factory-inserted ring of silver brazing alloy. (c) sectioned view of the completed Walseal joint showing penetration of alloy both ways from the insert. Walseal joints can be made only with Walseal valves or fittings. For further details regarding Walseal products, ask for Circular 84.

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Manufacturers since 1842

valves . . . fittings . . . pipe wrenches

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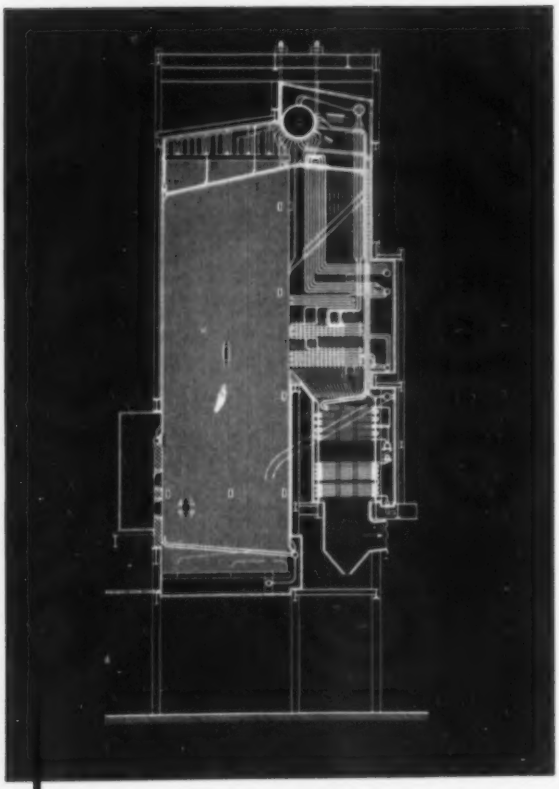
DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

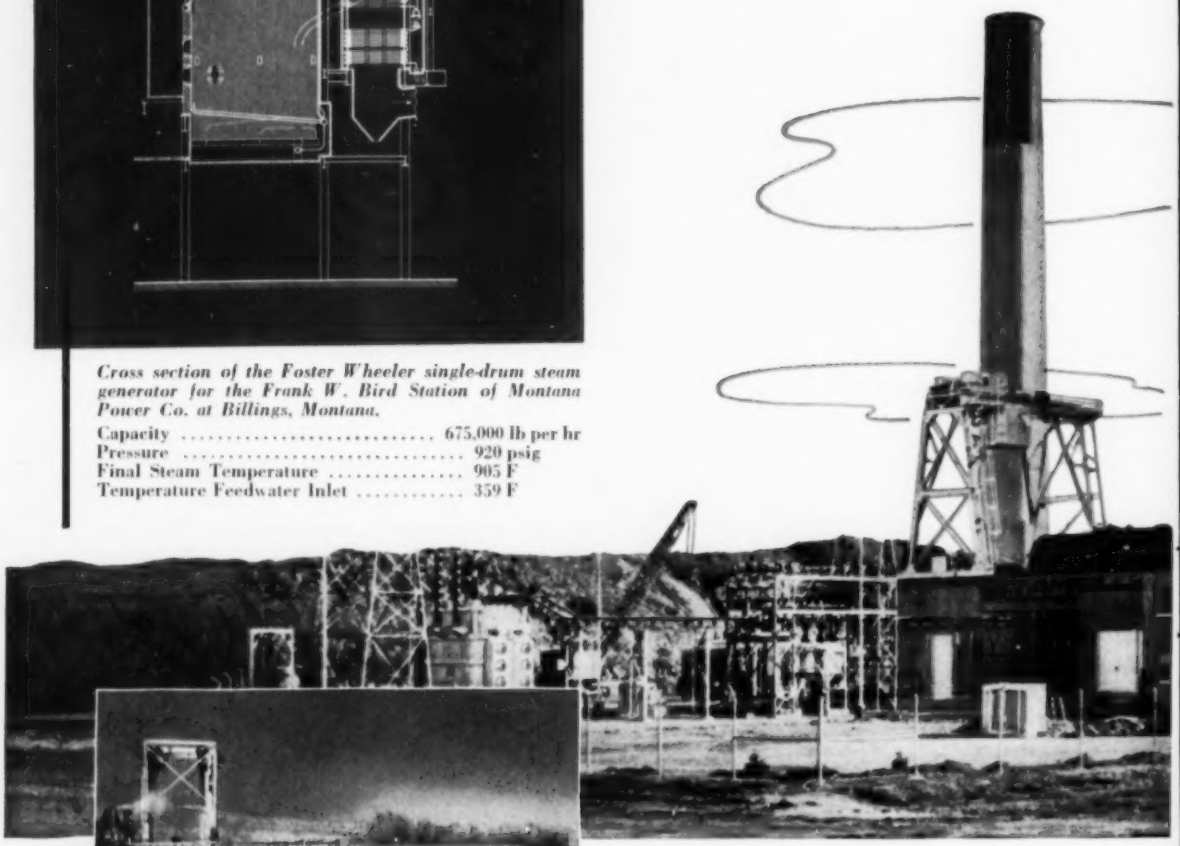
"Operation SUB-ZERO" Proves

Bird Steam Plant shows 11,400 Btu per kwh station output for all purposes



Cross section of the Foster Wheeler single-drum steam generator for the Frank W. Bird Station of Montana Power Co. at Billings, Montana.

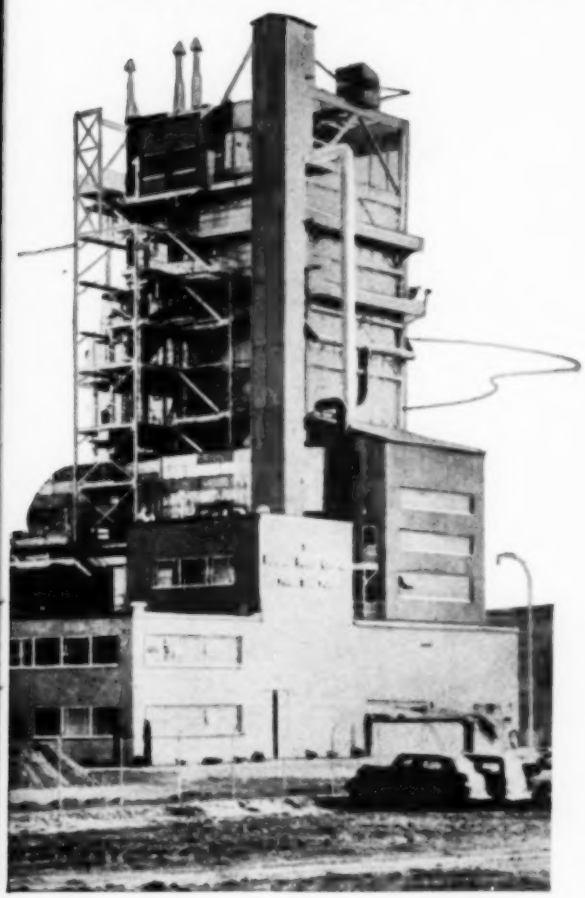
Capacity	675,000 lb per hr
Pressure	920 psig
Final Steam Temperature	905 F
Temperature Feedwater Inlet	359 F



Circulating water intake showing severe conditions of winter operation.

Efficient and Economical

Under the severe operating conditions of temperatures as low as —40F at an elevation of 3100 feet, this semi-outdoor plant of the Montana Power Company engineered by Ebasco Services Inc., has proved efficient and economical in operation and construction. Here are the facts:



HIGH STATION EFFICIENCY

During October 1952, with a metered daily average kwh output of 65,917, the fuel burned for a day consisted of 1,464 bbl of oil, plus 7,630,536 cu ft of natural gas. The oil provided 6,400,000 Btu per bbl, the gas 1,140 Btu per cu ft. Total Btu for all purposes per kwh station output was 11,400.

OPERATED ABOVE RATED CAPACITY

Although normal load condition did not require regular operation above 600,000 lb steam per hour and 60 megawatts, load was picked up to 705,000 lb steam per hour and 76 megawatts in fifteen minutes and carried for two hours.

MINIMUM PERSONNEL

Efficiently operated by only 4 men on each 8-hour shift.

CONSTRUCTED COST

Complete cost, on the basis of 66,000 kw, was approximately $87 per kw.

Once again, the operating facts of an installation indicate the ability of Foster Wheeler to design and fabricate power-producing equipment to meet your needs.

FOSTER WHEELER CORPORATION
165 BROADWAY, NEW YORK 6, N. Y.

FOSTER WHEELER

because NATIONAL TUBE considers every plant installation as an *individual problem...*

This free service may save you plenty!

• If you are thinking of rehabilitating present equipment or planning to expand your facilities, it will pay you to get National Tube's recommendations before you select tubing.

As the world's largest manufacturer of tubular steel products, we have analyzed and successfully solved thousands of tubing problems involving high pressures, corrosion, heat, and exposure.

By following the advice of our tubing specialists, many plants have been able to get much longer service out of their evaporator, condenser, heat exchanger, and other tubing applications. In some instances, our recommendations have doubled and even tripled tubing life.

Our recommendations will be based solely on the particular requirements your service involves. With National, *every installation is an individual problem and must be treated as such.* In other words, we fit the tubing to the job, not the job to the tubing!

If you want this kind of approach to your tubing problems, bring them to us. Chances are that we can save you plenty!

NATIONAL TUBE makes seamless tubing in the widest range of sizes and wall thicknesses and in a complete range of steel grades—from low carbon to the finest alloy and stainless steel. All National Seamless Tubing is pierced from solid steel of the finest quality.

USS

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(TUBING SPECIALTIES)

COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS • UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S NATIONAL *Seamless* PIPE AND TUBES

UNITED STATES STEEL

Before You Buy Blow-off Valves *ASK THESE QUESTIONS...*

EDWARD BLOW-OFF VALVES

Design simplicity . . . operating ease, low maintenance cost . . . stay tight, no trick construction. ASA pressure classes 300, 600, 900-1500, 2500 lb. Sizes 1½", 2" 2½"—straightway or angle flanged or socket welding ends—Stellite or Evalloy trim.

Q. *In a tandem blow-off valve hook-up, will both valves stay tight?*

With Edward, the valve nearest the boiler is the same design as its mate. Both are "sealing" valves.

Q. *Is the packing out of the highest temperature zone?*

Edward blow-off valves have only one set of packing, for the stem is the only working part that needs to be packed. Packing is above a condensate cooling chamber, removed from highest line temperatures.

Q. *Do the valves have backseats, so that packing can be replaced in service?*

With Edward, the answer is "yes".

Q. *Can leakage start through bonnet misalignment?*

Not with Edward blow-off valves. The Edward one-piece bonnet has no yoke posts to permit distortion.

Q. *Are parts of both blow-off valves interchangeable?*

Edward answers "yes". And with fewer working parts Edward blow-off valves need less maintenance. If part replacement is necessary, repairs are easier and less expensive with Edward.

Q. *Can the seat and disk bind together?*

Not Edward, because the disk lifts off the seat on operating instead of grinding against it. There is no sleeve to gall against the seat.

Edward Valves, Inc.

Subsidiary of ROCKWELL MANUFACTURING COMPANY
122 WEST 144th STREET
EAST CHICAGO, INDIANA

Another Product

Edward built the first steel blow-off valves. Installation records in America's major steam plants for nearly 50 years tell this story—no blow-off valves are better designed for year-in, year-out service with low maintenance. Write for Edward blow-off valve catalog, No. 12-D.

HALL INDUSTRIAL WATER REPORT

Hall Laboratories, Inc.—A Subsidiary of Hagan Corporation, Pittsburgh, Pa.

Volume 1 | APRIL 1953 | Number 2

Water as a Raw Material

The sea is a vast storage bin of elements necessary for 20th century industry. Extraction of elements requires the handling of tremendous quantities of water; 300,000 gallons of water to get a ton of magnesium, 5 million gallons for a ton of bromine.

Water is necessary to all industry, where it is used as a solvent, a carrier, a diluting element, dispersing and cooling agent, for cleansing. Water is your industry's most important raw material—don't waste it!

From British West Indies To Japan, Hall System* Goes International

Alex Henricks, engineer on the Hall headquarters staff, by-passed three weeks of U.S. winter weather in the British West Indies, where he initiated Hall System* in a sugar factory boiler house. This plant had asked advice of a local company (a Hall client) after suffering tube losses due to corrosion.

And Hall "know-how" in industrial water conditioning is now being exported to the Orient. Japan Organo, Ltd., representing Hall Laboratories, is introducing Hall System* and applying Threshold Treatment with Calgon* to cooling water as well as to various process industries. To accomplish this, Mr. Tadashi Nagao, chemist for 20 years with a Manchurian utility, recently spent 6 weeks at Hall headquarters.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information, write, wire, or call Hall Laboratories, Inc., P. O. Box 1346, Pittsburgh 30, Pennsylvania.

SLUDGE-STALLED BOILERS BACK ON THE LINE

Sometimes it's just plain sludge, but the unusual keeps Hall engineers hunting for process leaks

In one specific case, use of only 30 per cent of unsoftened make-up caused sticky sludge accumulation in tubes, and so deep in the drum that the feed pipe was almost covered. A quick analysis of this sludge by Hall Laboratories identified it as calcium phosphate, magnesium silicate, and magnesium phosphate.

Burosil* fed to the boiler precipitated the magnesium as magnesium silicate. Now boilers are virtually sludge-free, and operate through the entire heating season, instead of having to be cleaned at 2-month intervals, as formerly.

That was a normal problem. But the boiler water of a ceramic plant contained a lot more suspended matter than should have been there. A check on the feedwater by the Hall engineer showed why—it was carrying clay "slip."

When a break in the condensate line was located and repaired, no more "slip" was pulled into the system by the vacuum return system, and boiler operation returned to normal.

Once in a while, the Hall men run onto a corker. Like the boiler sludge that developed in a plant which makes certain catalysts. A sudden drop in boiler water alkalinity heralded the trouble. Make-up water composition had not changed, but inspection revealed an exceptionally heavy sludge. Analysis of the boiler water showed 5 times the normal dissolved silica concentration. Suspended solids showed high silica and alumina. Guided by these clues, the operators and Hall men traced the trouble to one of the process heat exchangers. Several leaky tubes were found which contaminated the condensate returns with catalyst.

It sounds easier, in capsule form, than it really was; however, the sludge problems were handled quickly, because in each case, facts developed at Hall Laboratories pointed a way to the solution.

Equipment for Water Analysis Shown to Pittsburgh Conference

In early March, Hagan Corporation exhibited apparatus, developed by Hall Laboratories for use in water analysis, to the Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy. Electrical conductivity equipment, cooling coils, and the Hagan Automatic Degasser for securing gas-free samples of condensed steam were shown.

Hall Certified Reagents were featured together with associated equipment for running Schwarzenbach hardness titrations, a new rapid anion exchange method for solids in boiler water, and other selected colorimetric and titration procedures.

*"Calgon" and "Burosil" are registered trademarks. "Hall System" is registered as a service mark by Hall Laboratories.

HIGHGROVE, CALIFORNIA. California Electric Power Company's new, modern 60,000 KW steam-electric generating plant now in commercial operation here was designed, engineered and constructed by The Fluor Corporation, Ltd. Many design innovations make this plant one of the most unique in existence. Except for the control rooms and switch gear the plant is completely outdoors and was planned for operation with an absolute minimum of attending personnel. The entire job was completed in advance of the originally scheduled operating date notwithstanding the extreme difficulty of obtaining some items of material and equipment. Additional units are being added to bring the total output to 140,000 KW. Fluor's ability to build efficient power plants has been ably demonstrated many times and is recorded in the illustrated brochure, "The Highgrove Story." Copies are available upon request. Fluor's broad experience also extends into the design and construction of all types of facilities – from the smallest unit to the largest – for the petroleum, natural gas, chemical, petrochemical and heavy industries anywhere in the world.

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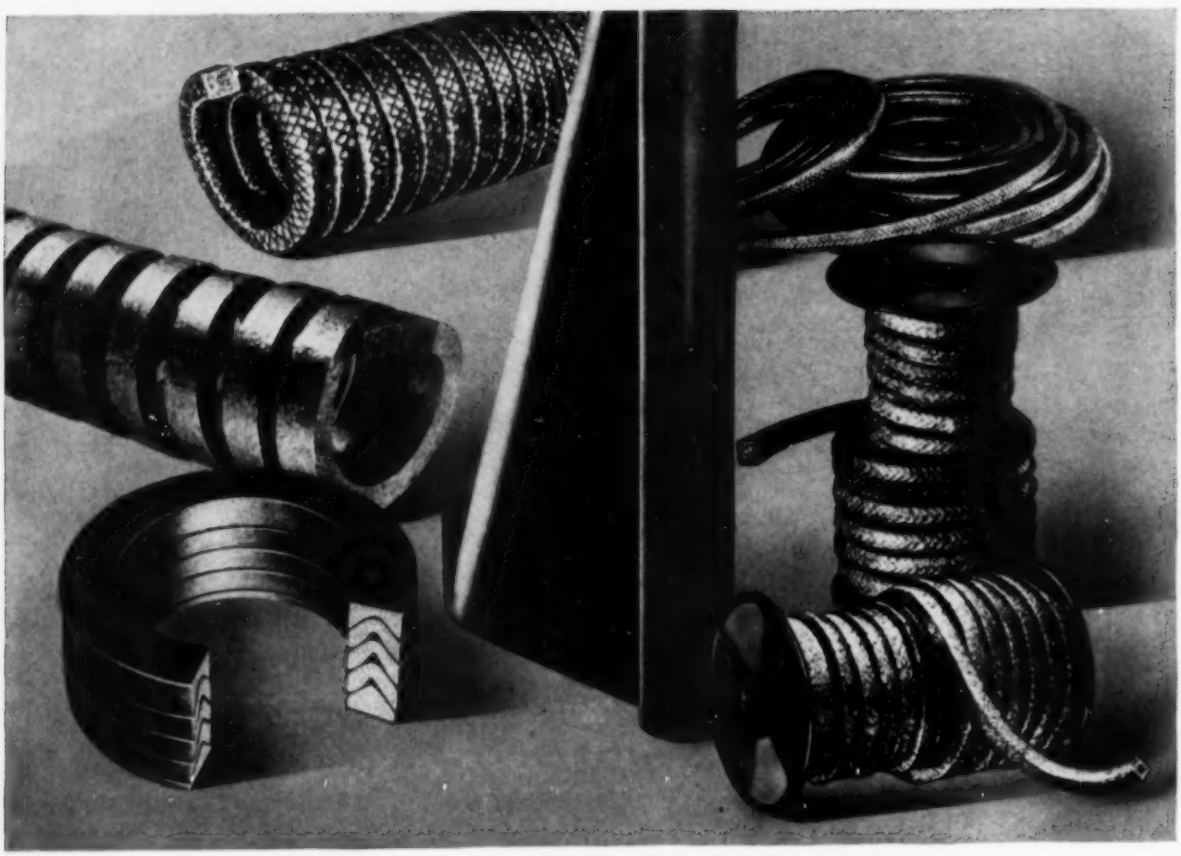
BIRMINGHAM
TULSA

HERE'S PACKING NEWS!



R/M's BIG 7 PACKING TYPES

95% of all packing needs are met with R/M's BIG 7

Lower inventories! Simplify ordering! Reduce downtime!

If you've thought you had to carry 10, 20, 50 different types of packings, forget it! Your plant probably needs only 3 or 4. R/M now has a basic line of *just seven* types of field-tested packings engineered to give custom-built performance in 95 percent of all applications. We call them the "Big 7" R/M Packing Types. To accomplish this engineering feat, R/M called into play 50 years of know-how and experience, and all of the research, testing and production facilities of its seven great plants. Exhaustive field testing has proved that all but the very rarest packing applications can now be met with the "Big 7" R/M Packing Types. Standardize on R/M Packings. You'll get superior performance every time. You'll lower your inventories, simplify your ordering, and reduce your downtime. For details, see your R/M distributor.

FACTORIES: Bridgeport, Conn.; Manheim, Pa.; No. Charleston, S.C.; Passaic, N.J.; Neenah, Wis.; Crawfordsville, Ind.; Peterborough, Ontario, Canada

R/M **PACKINGS**
RAYBESTOS-MANHATTAN, INC.
PACKING DIVISION, MANHEIM, PA.

RAYBESTOS-MANHATTAN, INC., Manufacturers of Packings • Teflon Products • Asbestos Textiles • Industrial Rubber Products • Abrasive and Diamond Wheels
Rubber Covered Equipment • Brake Linings • Brake Blocks • Clutch Facings • Fan Belts • Radiator Hose • Sintered Metal Products • Bowling Balls

NAVCO "Universal" PIPE SUPPORTS

Vertical adjustment up to 2½ inches can be made.

Support may be turned to any angle of 360°.

Will take care of 8 inches of travel.

Features

Universal Pipe Supports hold the pipe down as well as up. They prevent pipe from getting out of alignment, which is usual when Roller Supports are used.

They permit control of expansion movement and insure the desired free action of Slip Expansion Joints so essential in tunnel and duct work.

Expansion movement of pipe will not disturb the insulation.

Made in Cast Iron or Steel and provided with forced lubrication for lines exposed to the weather.

NAVCO

NAVCO PIPING

NATIONAL VALVE & MANUFACTURING COMPANY • PITTSBURGH, PA.

NEW YORK • CHICAGO • CLEVELAND • BOSTON • ATLANTA • TULSA • BUFFALO • CINCINNATI

ANACONDA FORUM
for the Electrical Industry

THE IMPORTANCE OF
PRODUCTION METHODS ANALYSIS
IN INDUSTRY

by Robert G Ely, Vice President
The Connecticut Light and Power Company

LOWER production costs, always a major concern of industrial management, have, due to inflationary pressures during the past several years, become the vital element of survival in our competitive markets. Fortunately better production methods, coupled with enlightened depreciation practice that provides for prompt replacement of obsolescent productive equipment, enable our industrial customers to stay in the race. And fortunately, America's engineers are past masters at continually developing better production methods. The pioneering work of Dr. Frank Gilbreth in time and motion study laid the groundwork for a fascinating field of engineering encompassing the fundamentals of continued profitable operation in any industrial activity—that of Production Method Analysis.

FROM RAW MATERIAL TO FINISHED PRODUCT

Production Method Analysis studies the operation from raw material to finished product—the method of handling materials, the sequence of operations and their logical physical relationships, the individual operators and their activities. It also studies bottlenecks of production, such as poor or obsolete equipment, inadequate wiring with its consequent voltage problems and decreased production rates, inadequately trained personnel, or lack of proper tools. In short, Production Method Analysis breaks down apparently complex operations into their simple component parts. From such analyses and the subsequent use of modern, high-speed, automatic machines properly tooled and in proper sequence, along with effective materials handling and efficient personnel who know their jobs, comes the healthy industrial employer who is so vital to the well-being of the community and, incidentally, to the utility serving that community. And therein lies our very real interest in Production Method Analysis.

INDUSTRIAL PAYROLLS VS. UTILITY INCOME

There is no mathematical sleight-of-hand involved in developing the relationship of industrial payrolls to utility income in any community or group of communities. Unable to pull up poles and move to where the grass may look greener, and confined to its franchise territory in its quest for new business, the utility's prosperity directly reflects the general prosperity of its service area. Lower production costs, therefore, become of vital concern to us as well as to our customers. Production Method Analysis as a tool in increasing production rates and reducing unit costs has therefore become part of our vocabulary, part of our thinking, part of our program of doing our utmost to help our manufacturers maintain and improve their competitive positions within their own industries.

ELECTRICAL EQUIPMENT PLAYS A PART, TOO

Our allies in the electrical equipment field have an important part in this program too. This is for the reason that better production methods depend on the availability of a sufficient supply of power in the right place at the right time, ready for application to the job of increasing the effectiveness of manhours through efficient transformation into mechanical or heat energy for the accomplishment of industrial tasks. Generating stations, transmission and distribution systems, adequate plant wiring and well engineered utilization equipment are all necessary parts in the over-all picture of industrial and community growth and health. All who have a part in the supply of these facilities strengthen the backbone of better production methods.

ANACONDA JOINTING KITS prevent the possibility of inadequate materials . . . keep stocks fresh and readily available for fast withdrawals. Illustration shows how complete these kits are—right down to a handy checklist of materials.

ANACONDA CABLE ACCESSORIES

A complete line—engineered by power-cable experts—is available in increased quantities.

At Anaconda, the increase in demand for cable accessories is being met by increased production. The complete line—with many exclusive features—consists of the following:

Potheads (capnut, switchgear, transformer, disconnect and through types), featuring unmatched interchangeability of parts.

Unit Packages of Jointing Materials. These kits contain everything needed to make a joint.

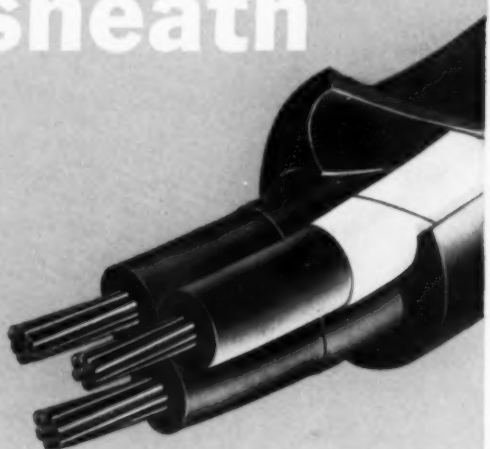
Filling Compounds. Balanced compounds mean greater stability.

Cable Paints and other miscellaneous accessory items.

Bring your cable and cable accessories problems to your Anaconda Representative.

Durasheath

the *all-purpose* ANACONDA Cable for both power and lighting services



Durasheath's* tough neoprene jacket stubbornly resists electrolysis, corrosion, temperature extremes, cutting, abrasion, impact, flame, oil, grease, moisture and most soil acids and alkalies.

Run it overhead, in ducts, or buried underground—or all three in one continuous run.

It's flexible, easy to handle, economical to install; made in single or multi-conductor construction.

Your nearest Anaconda Sales Office or Distributor can show you why it's good business to install this versatile, all-purpose cable. Just ask them.

*Trademark

TEN BASIC RULES FOR INDUSTRIAL WIRING

BY FRANK AIME, veteran electrical engineer of Anaconda Wire & Cable Company.

Successful operation of an industrial plant depends on the quality of its electrical distribution system. These rules should help in setting up a well-planned system for both large and small plants:

1. Design the system within supply limitations.
2. Locate supply near electrical load centers.
3. Know your load requirements.
4. Let requirements of processes, production and relative importance of the major characteristics of distribution systems determine distribution system type.
5. Select and arrange feeders and equipment so that interruptions never occur more than the process will allow.
6. Select all components from source to load for reasonable future growth.
7. Don't be limited by National Electric Code figures for conductors, conduit and protection which are minimum and primarily for safety.
8. Use load centers when feasible.
9. Select cables with best all-around characteristics for your condition.
10. Aim always for production efficiency, quality and safety.

ANACONDA RESEARCH AT WORK

How a new problem meant a new product

? The problem? Loads had outgrown duct space and duct sizes of lead-covered cables. Cables had to be run hotter and under more severe physical difficulties. Cable *sheaths* were failing before *interiors* . . . cable life was limited.

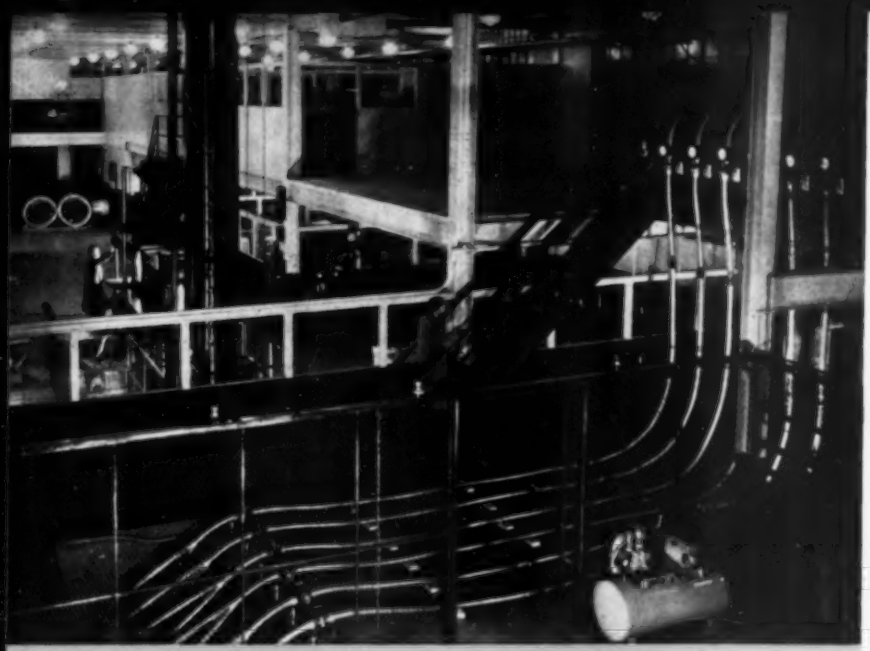
Anaconda research set out to find the answer. Hundreds of sheath alloys were tested. The one finally selected promised far better performance. Called ANACONDA F-3† alloy-lead sheath, it has a high burst strength and a low creep rate . . . resists bending and does not age-harden.

Once again, Anaconda's planned program of research solved a new problem with a new product. Yes, research like this pays off . . . in cable that serves you better!

RESEARCH IS ANACONDA'S BUSINESS, TOO!

†F-3 *Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.*

ANACONDA®



CYCLIC AGING TEST. Here's one method Anaconda Engineers use to learn how lead-covered, paper-insulated cables stand up. In this laboratory, cables are loaded under conditions similar to daily load cycles in the field, but at higher temperatures and voltages. Result: Anaconda Engineers get the facts fast . . . know what can happen years hence . . . and can give you much more reliable performance data.

WHY THIS MAN'S JOB MEANS BUILT-IN QUALITY IN THE CABLE YOU BUY

THIS IS ED GITTLESON, Anaconda's Chief Inspector and Manager of Quality Control.

Ed knows that to make a good product and sell it at the lowest possible price, quality must be built in right from the start. That's Ed's job—to see that it's done from raw material to final shipment. Ed has based Anaconda's control program on principles of statistical quality control that assure you not only of *greater* uniformity, but of a *higher level* of quality as well. You can be sure that every Anaconda product more than complies with your requirements.

No busduct system is truly flexible without this

New ANACONDA® Powerduct Cable

It's the only nonmetallic-armored busdrop cable UL approved for this hard use; cuts cost of relocating machines.

Even if you have a modern busduct system, it may be flexible only so far as it goes. You may still have to rip out permanent or semi-permanent wiring every time you rearrange important machines. That's costly.

Why not match your busduct system with money-saving ANACONDA Powerduct Cable . . . approved by Underwriters' Laboratories, Inc., for busway branches under section 3646, 1951 National Electric Code?

Powerduct Cable is much cheaper to install than conduit. It handles easily. Grips prevent cable creep. No time is lost. You get circuit capacity at any point for any load at any time. Coil (see illustration) makes local changes easy.

Its tough jacket takes heavy mechanical abuse, is flame-retardant, won't fray. Cold-flow is no problem. Cutting compounds, oil, acid, water, grease won't harm it.

Plan now to add flexible Powerduct Cable to your busduct system. Be sure that you insist on the ANACONDA Trademark—your positive proof of UL approval for this use.

the right cable for the job

SHORTS THAT MAKE SENSE

PRODUCTION TOOL. Good lighting is important in any plant. With it—high quality, profitable production and fulfilled schedules are possible. Without it —spoilage, reduced efficiency, lowered quality control and poor morale may send costs skyrocketing.

ADEQUATE CIRCUITS. A lighting system is no better than the circuits that serve it. Lamp efficiency, for instance, depends on operation at rated voltage. Make sure your circuits are adequate.

PLANNED SYSTEM LAYOUT. Lack of planning never pays off. A well-designed system always costs less than a poor one. Plan for tomorrow and you cut tomorrow's costs *today*.

TOMORROW'S LIGHTING NEEDS. Many plants install lighting circuits in working areas for an ultimate of two times present lighting intensity. Play smart and follow suit. You won't be caught with your lighting down.

CURRENT RATING. No one value of current-carrying capacity (amperes) can be assigned to any one size and design of cable. Installation and method of operation must be considered.

CABLE TERMINATIONS. Moisture, like death and taxes, plays no favorites. In making cable terminations, it pays to keep this in mind—even at low voltages. There tightness against moisture is just as important as for higher ratings. Yet it's here that failures are far more frequent. Probably due to the feeling that here anything will do in the way of terminating the cable.

OVERHEAD VS. UNDERGROUND. For appearance' sake only, overhead distribution systems are often replaced by more expensive underground systems. But it's entirely possible such a change will also result in a lower annual cost. Reason: freedom from damage by trees, wind, sleet, ice, etc. Reliability is improved.

"LIVE"
INSULATING
OIL

Heat and electrical stress produce deterioration products which eventually sign the death warrant for insulating oil. Carbon black keeps such oil "alive." It minimizes and removes deterioration products and keeps them outside the field of the dielectric. It continually purifies and stabilizes the oil . . . keeps it clean.

Only ANACONDA Type CB* Power Cable utilizes this phenomenon. Result: greater stability and longer life. This tested paper cable may be obtained with special carbon black binder which adds resiliency, yet possesses adequate strength. A further improvement, F-3** Alloy-Lead Sheath, triples sheath life by its high resistance to slow-bending fatigue, creep, burst and abrasion.

If you're not using Type CB Power Cable, you aren't getting as much service out of your paper cables as you should. We suggest you get the full story from your nearest Anaconda Sales Office.

* CB—Carbon Black (U. S. Patents 2,102,129, 2,405,853) Reg. U. S. Pat. Off.

** F-3—Arsenic-Lead Alloy (U. S. Patents 2,300,788, 2,375,755, 2,504,600 and 2,570,501) Reg. U. S. Pat. Off.

FOR FURTHER INFORMATION about any product mentioned in the pages of this advertisement, see your Anaconda Representative . . . or write to *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

ANACONDA®

TODAY'S HEADQUARTERS FOR WIRE AND CABLE

MAKERS OF

building, barn, machine tool, control and communication wire • service and overhead distribution cables, bare and weatherproof including ACSR • portable cords and cables • power and bus-drop cables • mine, bridge, aerial, underground, duct, network and submarine cables • parkway, airport and street-lighting cables • station, apparatus and vertical-riser cables • magnet wire • copper, aluminum and copperweld conductors • wire and cable accessories.

FIRST *complete* packaged boiler

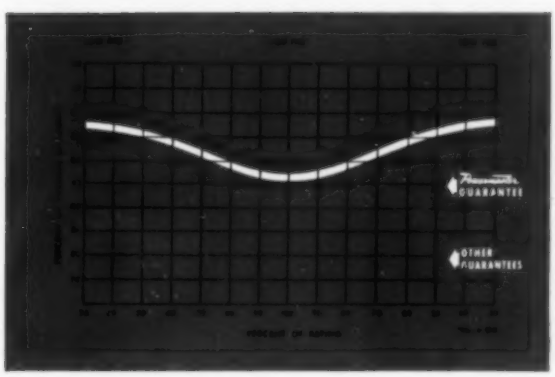
FIRST full modulating cam control

FIRST *Voriflow* air-atomizing burner

FIRST immediate change-over—oil or gas

NOW—*Powermaster*® is FIRST to guarantee 83% minimum efficiency

The "pay-off" on a boiler is its operating efficiency . . . and *only Powermaster guarantees a minimum of 83%* with No. 6 oil!



Take a look at the typical efficiency curve of *Powermaster* shown here . . . then compare A.S.M.E. tests with those of any other boiler. At less than full load (which is normal in field operation) notice that *Powermaster* efficiency actually *increases.*

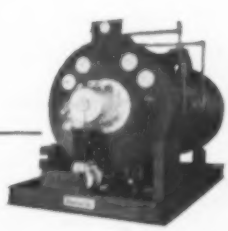
There's a reason for such efficiency. The *Powermaster* is the development of 68 years' experience in boiler manufacture. Continuing research and progressive engineering have resulted in *Powermaster* users being the first to benefit from major improvements in packaged boiler design.

Point-by-point, *Powermaster* welcomes comparison. Before deciding on a new boiler for your plant, be sure to get the facts on the newest *Powermaster* with *Voriflow* combustion. Just drop us a line and we'll be glad to send you our new catalog.

Powermaster®

PACKAGED AUTOMATIC BOILERS

In sizes to 500 HP; pressures to 250 psi.



ORR & SEMBOWER, INC. • *Established 1885* • 910 MORGANTOWN ROAD, READING, PENNA.

VULCAN at WABASH RIVER STATION

PUBLIC SERVICE COMPANY of INDIANA, INC.

ADD Wabash River to the rapidly growing list of utility stations entrusting to VULCAN the important job of boiler cleaning. This Vulcan System includes long retractables, rotary units and air-heater cleaner controls—each designed for a specific cleaning job. They clean effectively at low cost, and are easily maintained. Large or small boilers, utility or industrial, power or process—you can depend on Vulcan designed-for-the-job soot blower systems.

BOILER DATA

Steam Generators. . Foster Wheeler Reheat Type

Capacity, each. . 700,000 lb per hr

Operating Pressure. . . . . 1500 psig

Final Steam Temperature. . . 1005 F

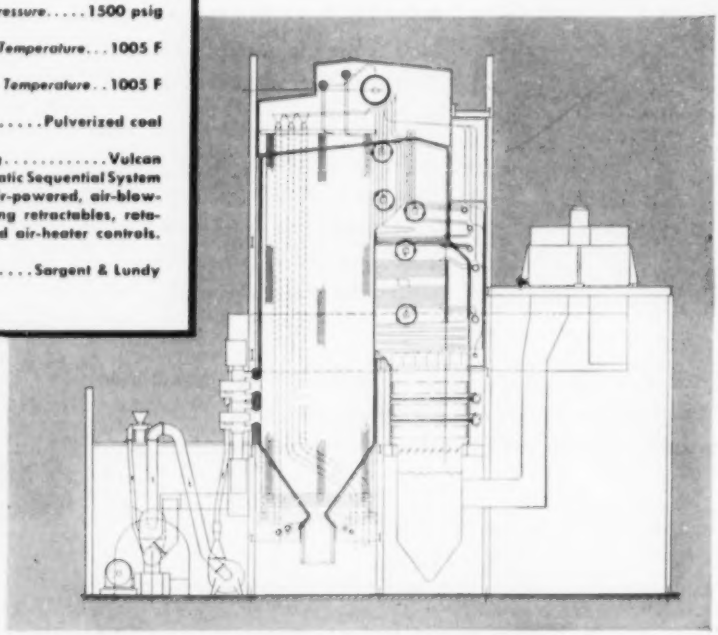
Final Reheat Temperature. . 1005 F

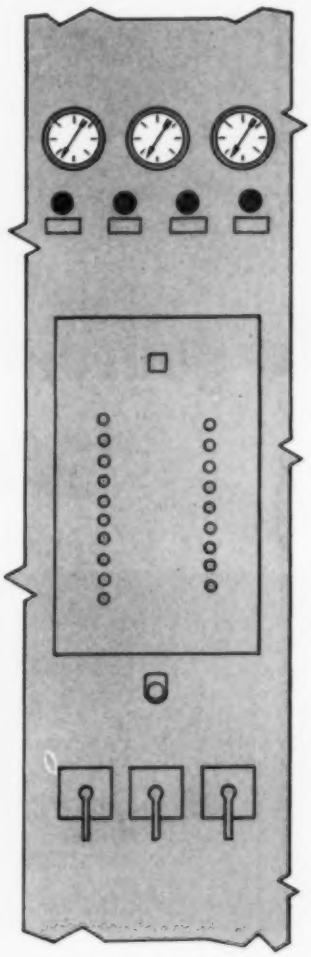
Fired by. . . . . Pulverized coal

Soot Blowing. . . . . Vulcan Automatic Sequential System with air-powered, air-blowing, long retractables, rotaries and air-heater controls.

Consultants. . . . . Sargent & Lundy

COPES-VULCAN DIVISION
CONTINENTAL FOUNDRY & MACHINE COMPANY
ERIE, PENNSYLVANIA



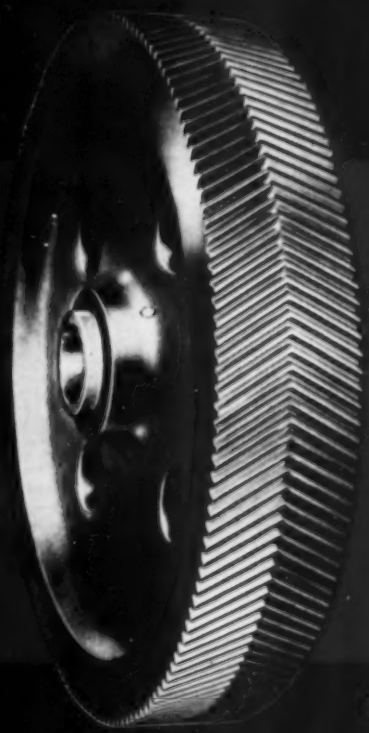


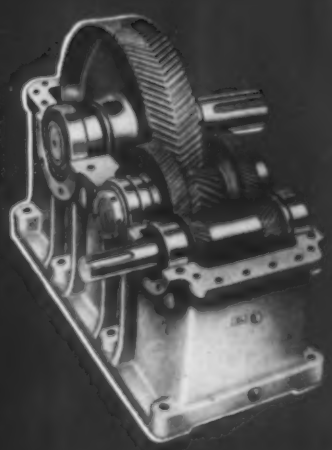
At Wabash River Station, all soot blower instruments and controls are grouped conveniently on the operating panel for each boiler. Automatic-Sequential Control, with only a flick of the wrist, puts all blowers in automatic or selective sequence, or they may be individually operated by push button from the central panel. Separate open or cubicle type panels are available.

VULCAN *Automatic Soot* **BLOWERS**

Reliable

POWER TRANSMISSION





PHILADELPHIA
WORM GEAR
SPEED REDUCERS

For right angle drives—horizontal or vertical. Ratings to 250 h.p. Ratios 3½:1 to 6300:1.

GEARS

All types, sizes and materials

PHILADELPHIA
HERRINGBONE
SPEED REDUCERS

Single, double, triple reductions. Ratios 1.75:1 to 300:1. High efficiencies.

SERVING SOUTHERN INDUSTRY from LYNCHBURG, VA.

For catalogs or detailed information, write Virginia Gear and Machine Corp., Lynchburg, Va. or the address below.

Philadelphia Gear Works, INC.

ERIE AVE. AND G ST., PHILADELPHIA 34, PA.

NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.

Industrial Gears and Speed Reducers
LimiTorque Valve Controls

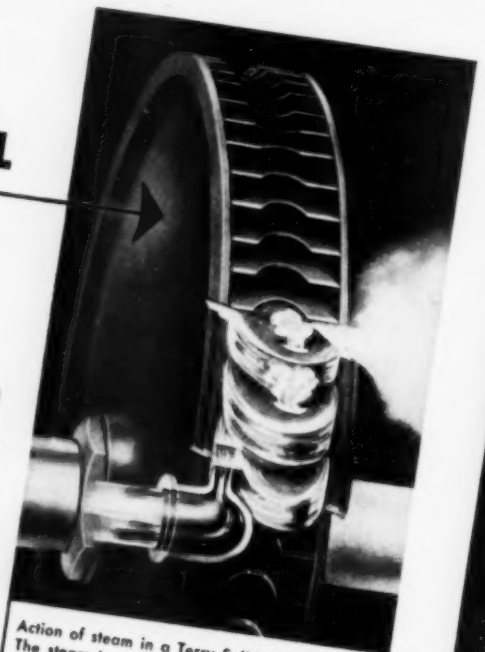
TERRY

THIS TURBINE WHEEL

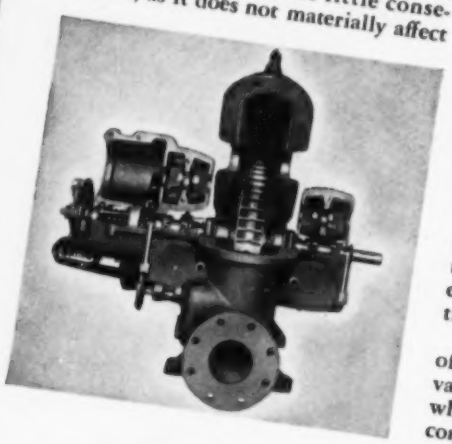
has no parts to loosen or work out

The rotor of the Terry Solid-wheel Turbine is a single forging of special composition steel, in which a series of semi-circular buckets is milled. There are no separate parts to become loose or work out.

The power-producing action of the steam takes place on the curved surfaces at the back of the buckets. Hence, wear of the blades is of little consequence, as it does not materially affect horsepower or efficiency. There is practically no end thrust since the steam enters and leaves the wheel in a direction at right angles to shaft.



Action of steam in a Terry Solid-wheel Turbine. The steam issues from an expanding nozzle at high velocity and enters the side of the wheel bucket where its direction is reversed 180°. As this single reversal uses but a portion of the available energy, the steam is caught in a stationary reversing chamber and returned again to the wheel. This process is repeated several times until practically all of the useful energy has been utilized.



This is only a small part of the story of the many advantages of the Terry Solid-wheel Turbine. Write for complete details.

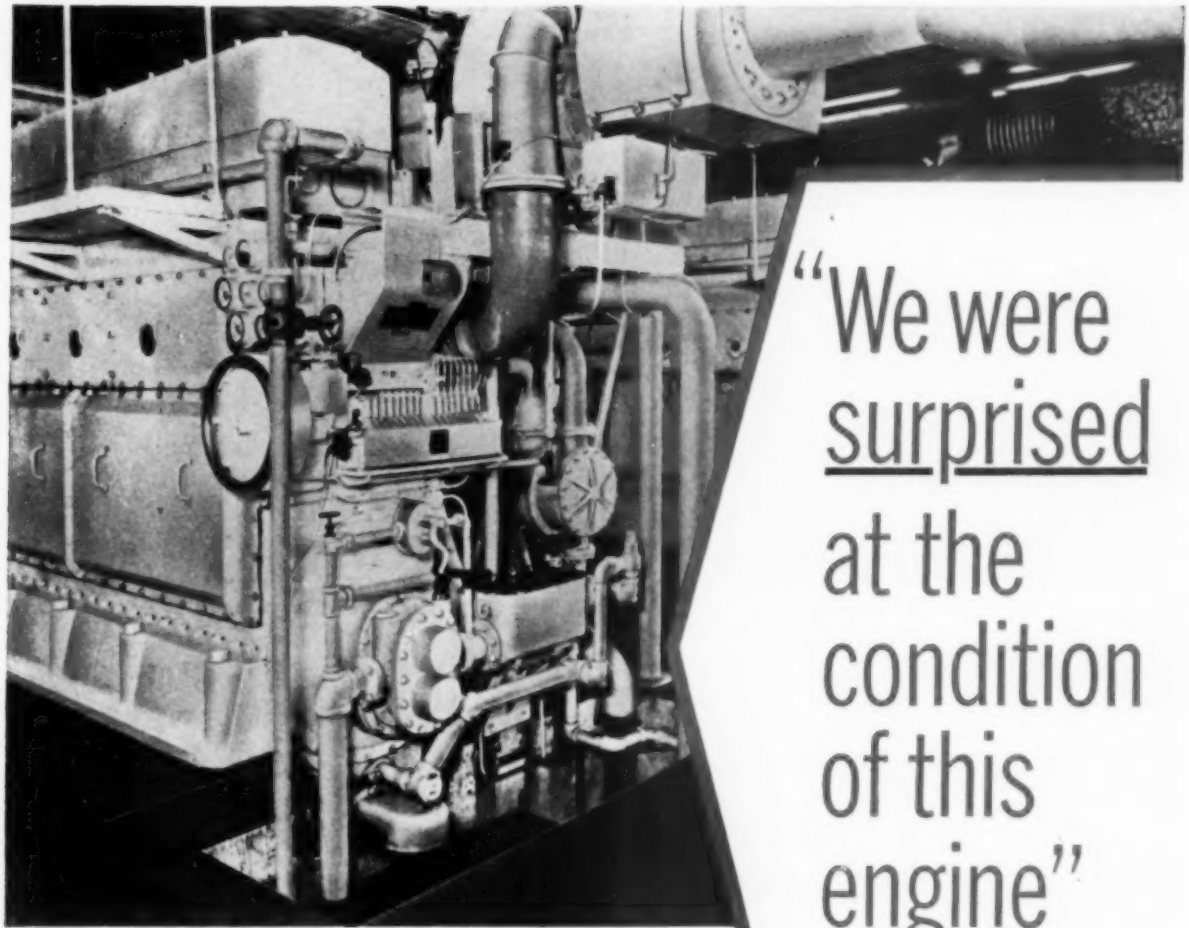
THE TERRY STEAM TURBINE CO.

TERRY SQUARE, HARTFORD 1, CONN.

TT-1189

Memo

Send for a copy of bulletin S-116 which describes the many advantages of the Terry Solid-wheel Turbine.



"We were surprised at the condition of this engine"

... says G. V. Yarger,
Supt. Municipal Utilities
Waverly, Iowa

"When we finally opened up our Worthington, it was in the *best* condition I've ever seen a diesel engine that had operated such long hours and under such heavy loads as this unit. It had a total of 48,926 hours on it – 8,987 hours of tough operation since the last overhaul.

Mr. Yarger continues, "We've been using Sinclair RUBILENE® Heavy in the crankcase and RUBILENE H.D. 30 in the cylinder lubricator. These RUBILENES have kept the crankcase and upper portions of the cylinders exceptionally clean and bright, with no sign of carbon or deposits."

That's a typical report on the exceptional qualities of the Sinclair RUBILENES . . . evidence that they could improve the efficiency of *your* diesels, too. Why not switch now? Contact your nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR DIESEL OILS

save wear and replacements

This power plant uses Link-Belt self-propelled trippers to discharge coal to bunkers from twin Link-Belt 36-in. wide belt conveyor systems, each handling 450 TPH.

TOTAL ENGINEERING

It's LINK-BELT's answer for improved belt conveyor performance

BELT conveyor efficiency begins with correct analysis of overall system requirements. And right from the start Link-Belt offers you unique advantages. Our engineers can apply broad experience to your bulk handling problems.

Working with a complete line of quality components, they can select the belt conveyor equipment best suited to your exact needs. What's more, Link-Belt has a nation-wide engineering organization that will follow through on every detail. This includes supplying all related equipment . . . building supporting structures and enclosures . . . erecting the complete job, if desired.

It's easy to see why "total engineering" results in top belt conveyor performance. For complete information, call the Link-Belt office near you today.

13.131-B

LINK-BELT

BELT CONVEYOR EQUIPMENT

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle, Toronto, Springs (South Africa), Sydney (Australia). Sales Offices in Principal Cities.

LINK-BELT builds a complete line of belt conveyor components

ALL TYPES OF ROLLER BEARING IDLERS

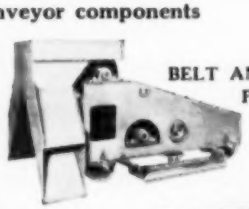
Impact-cushioning idler

45° troughed idler

Belt-training idler

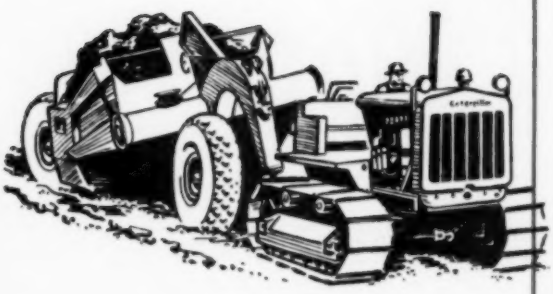
20° troughed idler

Return idler

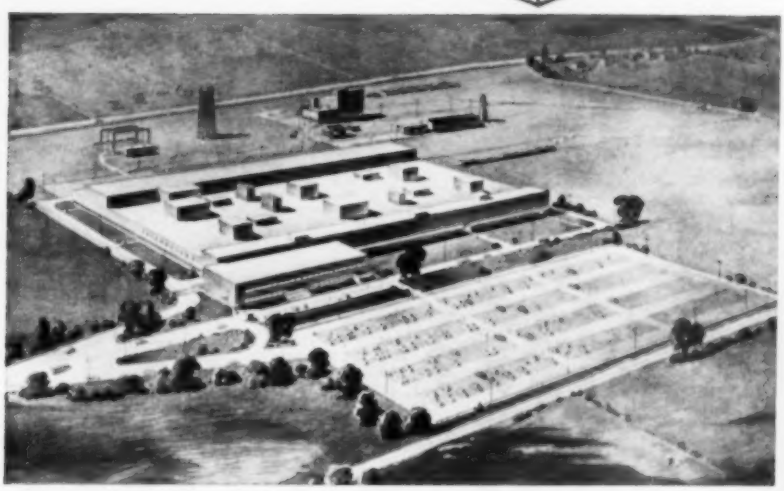


BELT AND MOTOR PROPELLED TRIPPERS

COMPLETE TERMINAL MACHINERY



TWO WICKES STEAM GENERATORS will help heat the CATERPILLAR TRACTOR CO.'s new plant at York, Pa.



CONTRACTORS: Consolidated Engineering Company Inc., Baltimore, Md.
CONSULTING ENGINEERS: Whitman, Requardt & Associates, Baltimore, Md.

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The Caterpillar Tractor Co., one of the world's largest manufacturers of earth moving equipment, will shortly open their new York, Pa. plant where several hundred men will turn out track assemblies for world famous Caterpillar D6, D7 and D8 Tractors. In this modern manufacturing facility, Caterpillar has installed two 80,000 lb. WICKES steam generators to obtain efficient, economical heat throughout the 360,000 sq. ft. structure. These Type R 2-drum WICKES boilers have a design pressure of 200 psi. and are equipped with economizers and spreader stokers. WICKES can fill your requirements for steam generators up to 250,000 lbs. per hour and 1000 psi. — all types of multiple drum boilers, adaptable to any standard method of firing: oil, gas, underfeed or spreader stoker. Consult your nearest WICKES representative or write us today for descriptive literature.

WICKES

THE WICKES BOILER CO., SAGINAW, MICHIGAN • DIVISION OF THE WICKES CORPORATION

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WITH ITS SUPERIOR STRUCTURAL VALUES

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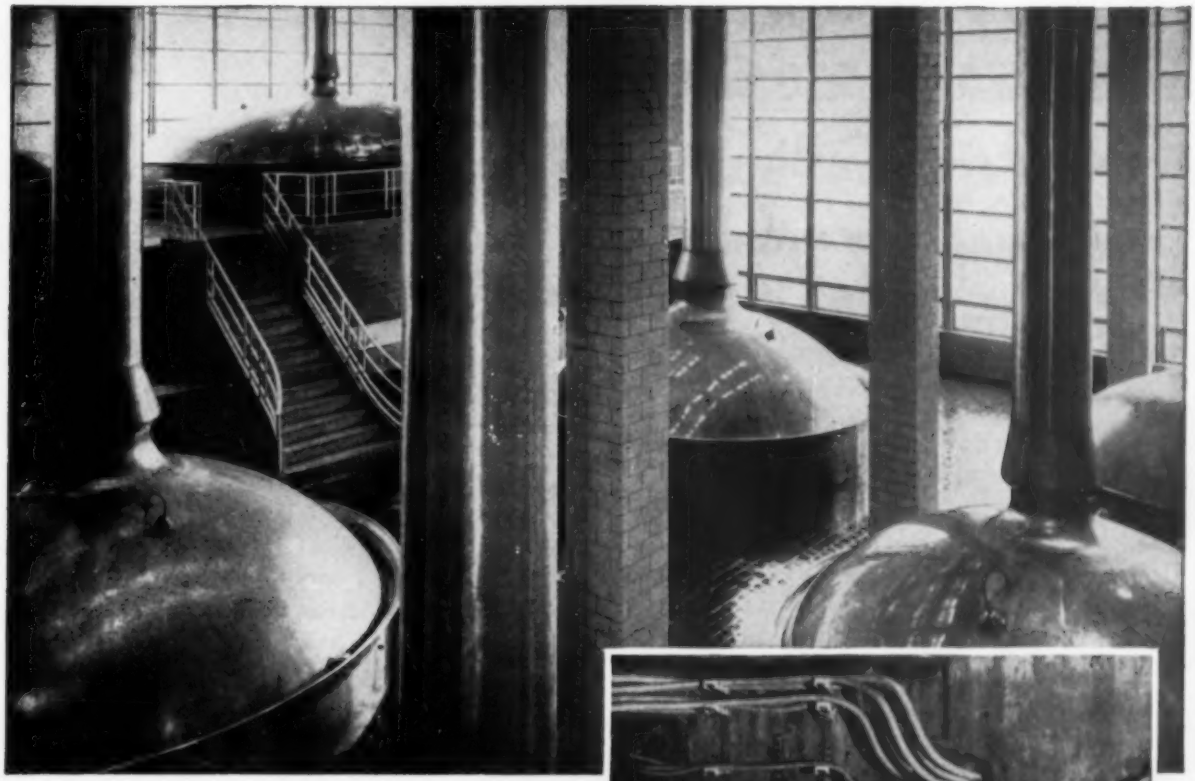
Telephone Lamar 7113



they use the best of everything at

Anheuser-Busch

Famous the world over for its fine quality, Budweiser Beer is carefully and expertly brewed from the very choicest ingredients. Of equal importance are the equipment and techniques used; and so, throughout the entire brewing cycle, Anheuser-Busch leaves nothing to chance.

In keeping with this policy, Anheuser-Busch's new brewery at Newark, N. J., uses Okolite-Okoprene cable throughout for primary and distribution feeders. Since an uninterrupted power supply is an important factor in maintaining the famed Budweiser quality, only the best electrical cables will do — Okolite-Okoprene cables.

It's the doubly durable combination of Okolite insulation and Okoprene sheath which makes these cables the No. 1 choice for electrical circuits which must not fail. The Okolite insulation provides maximum dielectric strength; the Okoprene sheath is resistant to moisture, heat, sunlight, weather, and most oils, acids and alkalies. Together, insulation and sheath applied by Okonite's strip process provide the circuit security which cannot be obtained by conventional methods of cable manufacture.

The research and engineering which go into all Okonite cables, the extremely high test voltages, the unusual and exclusive manufacturing techniques, will interest every engineer. You'll find it all in Bulletin SP-1053, The Okonite Company, Passaic, N. J.

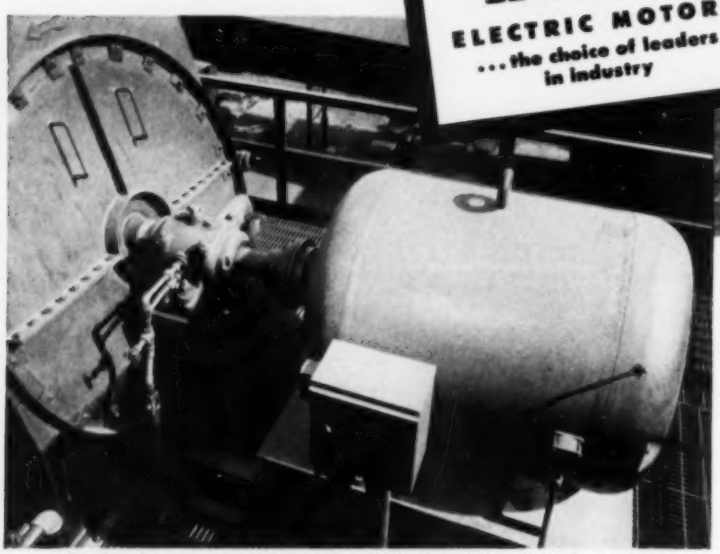
The best cable is your best policy

OKONITE — SINCE 1878 — *insulated wires and cables*

1109

This 250 hp, 220 volt motor starts with minimum line voltage disturbance...

Wagner
ELECTRIC MOTORS
...the choice of leaders in industry



This fly ash control equipment, on the roof of a Detroit Auto Body Corporation, is powered by a 250 hp, 220 volt, 1160 rpm, totally-enclosed Wagner motor.

because it's a

Wagner

Increment Motor and Starter Combination

The part-winding increment motor and starter combination (pioneered by Wagner) provides an economical method of starting polyphase squirrel-cage motors for any application where reduced current draw at start is required or desirable. No auto-transformers or resistors are necessary.

Voltage disturbances on the line are reduced because current taken from the line is not broken during the starting period—as is the case when auto-transformers or compensator-type starters are used.

You benefit when you install a Wagner increment motor and starter "package" because you get a highly efficient, most economical, motor and starter combination that limits inrush of motor current to values that are acceptable to most power companies for all or parts of their distribution systems.

* * *

When you standardize on Wagner Motors—you get the advantages of a liberal warranty . . . of nationwide service facilities, with on-the-spot service, replacement motors and parts available from 25 Wagner-owned Service Branches and more than 750 Authorized Service Stations. You can choose from a wide variety of types and sizes (from 1/125 to 400 hp.) Bulletin MU-185 gives complete information—write for your copy. Bulletin MU-128 gives full information on Wagner Increment Motor and Starter Combinations.

WAGNER ELECTRIC CORPORATION
6383 Plymouth Ave., St. Louis 14, Mo., U.S.A.

Wagner Electric Corporation
EST. WE 1891

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS — AIR AND HYDRAULIC

BRANCHES IN 32 PRINCIPAL CITIES

M53-6

New!

Look what Powers has done to **Modernize** Control Valves

Powers NO-PAK Valves Banish Packing Maintenance
Prevent leakage of water or steam or loss of vacuum

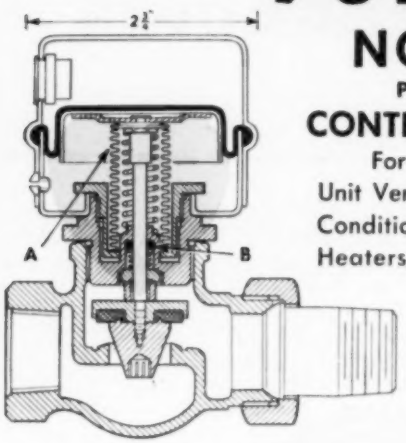
POWERS

NO-PAK

Pneumatic

CONTROL VALVES

For Convectors, Unit Ventilators, Unit Air Conditioners, Baseboard Heaters, Radiators, etc.



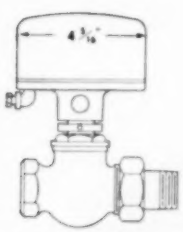
Various Types and Sizes for all requirements

Another POWERS Contribution to Better Heating and Air Conditioning Control

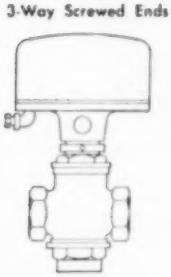
NO-PAK valves with their many advantages are now standard with Powers temperature control systems. Their superior performance is due to Duo-Seal construction.

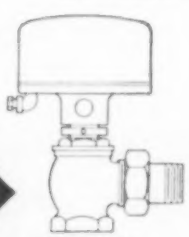
Bronze Packless Bellows (A) in sectional view above, is the primary seal which eliminates packing maintenance — packing friction — steam and water leakage or loss of vacuum. It is designed to withstand pressure up to 150 psi. Maximum valve stroke is only two-thirds of the normal bellows stroke. A spring loaded secondary seal (B) permits servicing of valve top without draining the water system or shutting down the steam heating system. Seal is made of highly elastic neoprene and is ready to act at any time. Small contact between seal and the highly polished stainless steel stem makes friction a negligible factor.

For utmost dependability and lowest cost maintenance specify control by Powers NO-PAK Valves.

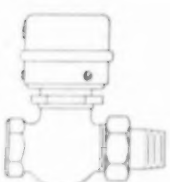


Straightway Union
3-Way Screwed Ends

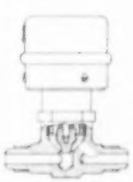




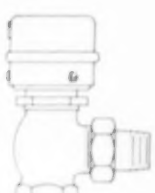
Angle Union



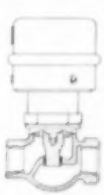
Straightway Union



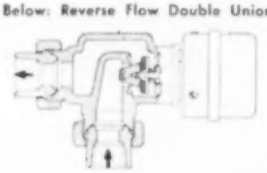
Flared Ends



Angle Union
Screwed Ends



Below: Reverse Flow Double Union



(152)

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1333 Spring St., Atlanta, Ga. 101 N. Elm St., Greensboro, N. C.

You're Always on the Safe Side

WHEN YOU SPECIFY

ASHCROFT Maxisafe DURAGAUGES

Here is the gauge that provides absolute protection to the viewer from tube rupture due to any cause.

In this new Ashcroft Maxisafe* Duragauge, an integrally cast solid wall separates the dial from the Bourdon tube and movement. The entire back of the case is covered by a double spring-mounted safety release plate. Teflon coated and tightly fitted on a rubber gasket, the plate is held in place by a knurled knob. If the tube ruptures, pressure less than ½ p.s.i. will force the plate open and vent the discharge to the rear.

Always be on the safe side. Get absolute protection against the possibility of tube rupture — specify the Ashcroft *Maxisafe* Duragauge. The *Maxisafe* has all the long-life durability and precision accuracy of standard Ashcroft Duragauges. It's available in all Duragauge pressure ranges, Bourdon tube materials, case designs (except Types 1179 and 1279), and mountings, in 4½, 6 and 8½ inch dial sizes. Ask for details in selecting *Maxisafe* Duragauges. Phone your local Ashcroft Gauge Distributor.

*Reg.

NOTE THE SOLID WALL

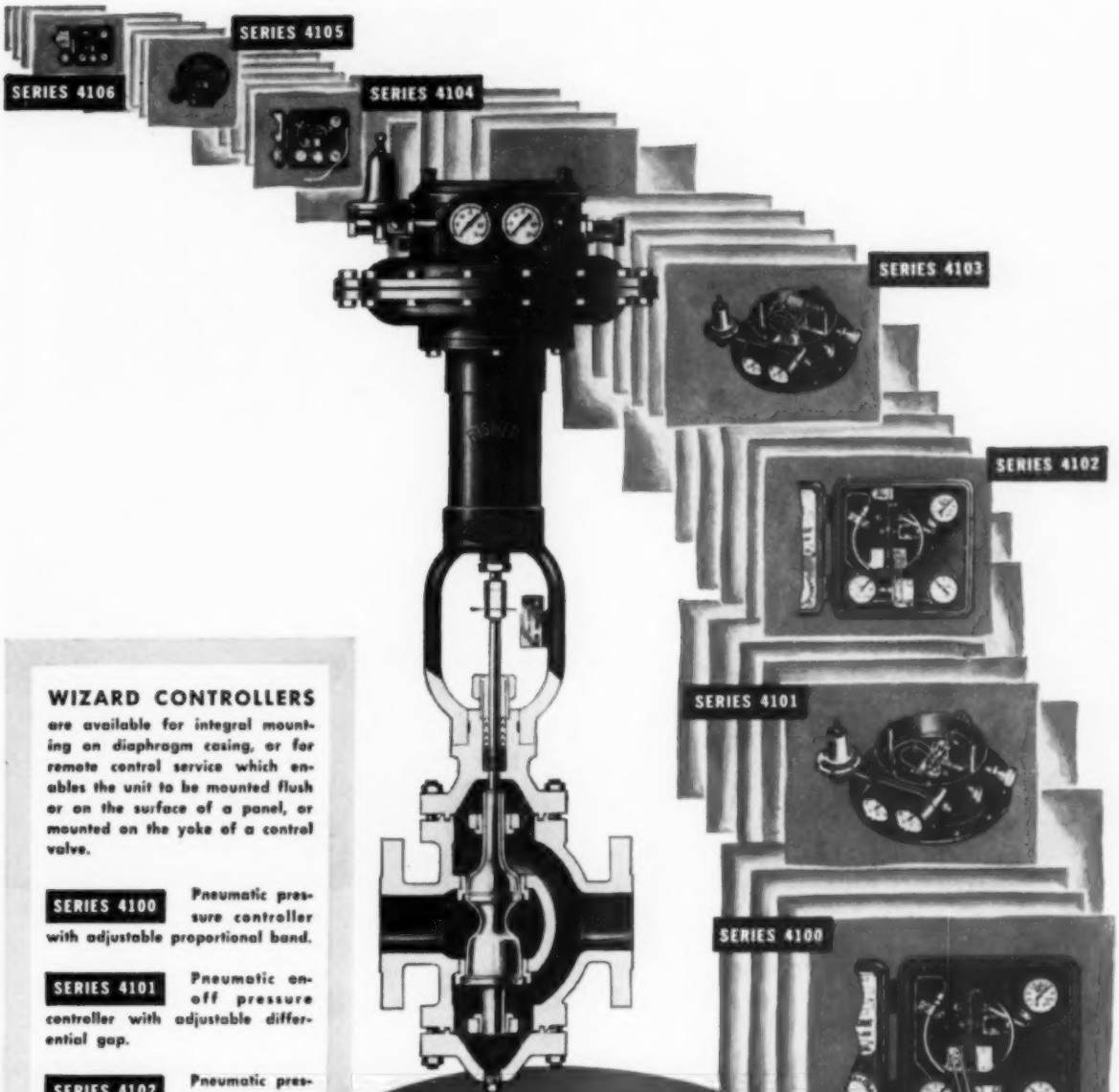
that separates the dial from the Bourdon Tube and movement. Three ¾" lugs on the back flange hold the *Maxisafe* away from the wall and permit the safety plate to release. *The case design also provides easy, quick access to the movement and tube assembly for inspection, repair or recalibration.*

FOR FAST DELIVERY — buy from your Industrial Distributor. He stocks Manning, Maxwell & Moore products locally — saves you the trouble and expense of maintaining a large inventory in your own plant.

ASHCROFT GAUGES

A product of **MANNING, MAXWELL & MOORE, INC.** STRATFORD, CONNECTICUT

MAKERS OF 'ASHCROFT' GAUGES, 'HANCOCK' VALVES, 'CONSOLIDATED' SAFETY AND RELIEF VALVES, 'AMERICAN' INDUSTRIAL INSTRUMENTS. BUILDERS OF "SHAW-BOX" AND 'LOAD LIFTER' CRANES, 'BUDGIT' AND 'LOAD LIFTER' HOISTS AND OTHER LIFTING SPECIALTIES.



WIZARD CONTROLLERS are available for integral mounting on diaphragm casing, or for remote control service which enables the unit to be mounted flush or on the surface of a panel, or mounted on the yoke of a control valve.

SERIES 4100 Pneumatic pressure controller with adjustable proportional band.

SERIES 4101 Pneumatic on-off pressure controller with adjustable differential gap.

SERIES 4102 Pneumatic pressure controller with non-bleed orifice and low pressure cut-off.

SERIES 4103 Low pressure Wizard, bellows actuated with differential gap.

SERIES 4104 Wizard controller with differential gap and non-bleed pilot.

SERIES 4105 Bellows actuated differential pressure controller.

SERIES 4106 Low pressure, bellows actuated, Wizard pressure controller.

FISHER®

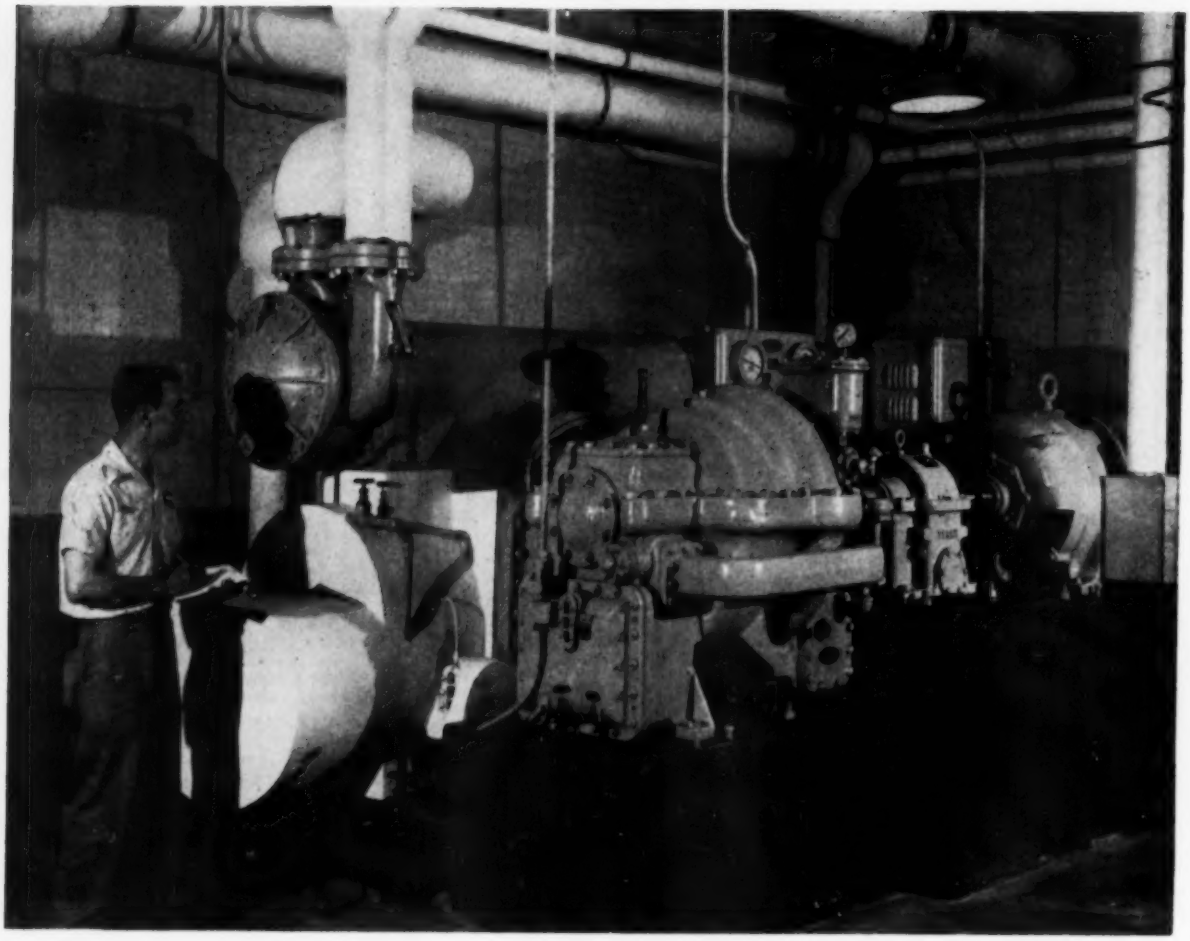
FISHER®

WIZARD PRESSURE CONTROLLERS

Available in a variety of constructions for your particular requirements in the CHEMICAL PROCESS INDUSTRIES, GAS DISTRIBUTION, PIPE LINE TRANSMISSION, POWER PLANTS, REFINERIES, OIL PRODUCTION and GENERAL INDUSTRIAL APPLICATIONS.

FISHER GOVERNOR COMPANY • Marshalltown, Iowa

WORLD LEADER IN THE MANUFACTURE OF LIQUID LEVEL CONTROLLERS, PRESSURE REGULATORS AND IN RESEARCH FOR BETTER CONTROL



You Can't Tell

YOU CAN'T DETERMINE efficiency by sound alone. Just because the wheels of your machinery are humming does not necessarily mean that down time caused by faulty lubrication is being held to a minimum. The problem of lubrication becomes more important and more difficult with the ever increasing complexity of modern industrial equipment operating at higher speeds with closer and closer tolerances, higher loads, and under varying operating conditions. To be sure of having the proper lubricants to fill your specific needs, call an experienced Standard Oil lubricating engineer. His knowledge, gained through constant contact with the power industry, is backed by the world's largest combined facilities for the research, testing and engineering of petroleum products. It will be well worth your while to call him today.

Standard Oil Company
(KENTUCKY)

STANDARD OIL
LUBRICANTS

"LITTLE SQUIRT" is a BIG SHOT on the Southern!

OUR "LITTLE SQUIRT" is an ingenious gadget that oils car journals automatically for the first time in railroad history. And it does the job more effectively than it has ever been done before.

But the big thing about "Little Squirt" is not what it does but what it *represents*. For like many others we are using, this better-railroading tool, on which a patent is pending, was invented right here on the Southern as a result of our constant search for new ways to do a better job.

This policy of "constructive discontent"—of never being satisfied with things as they are—leads to answers, large and small, that help us provide continuing low-cost, dependable, ever-improving transportation service for the South we serve.

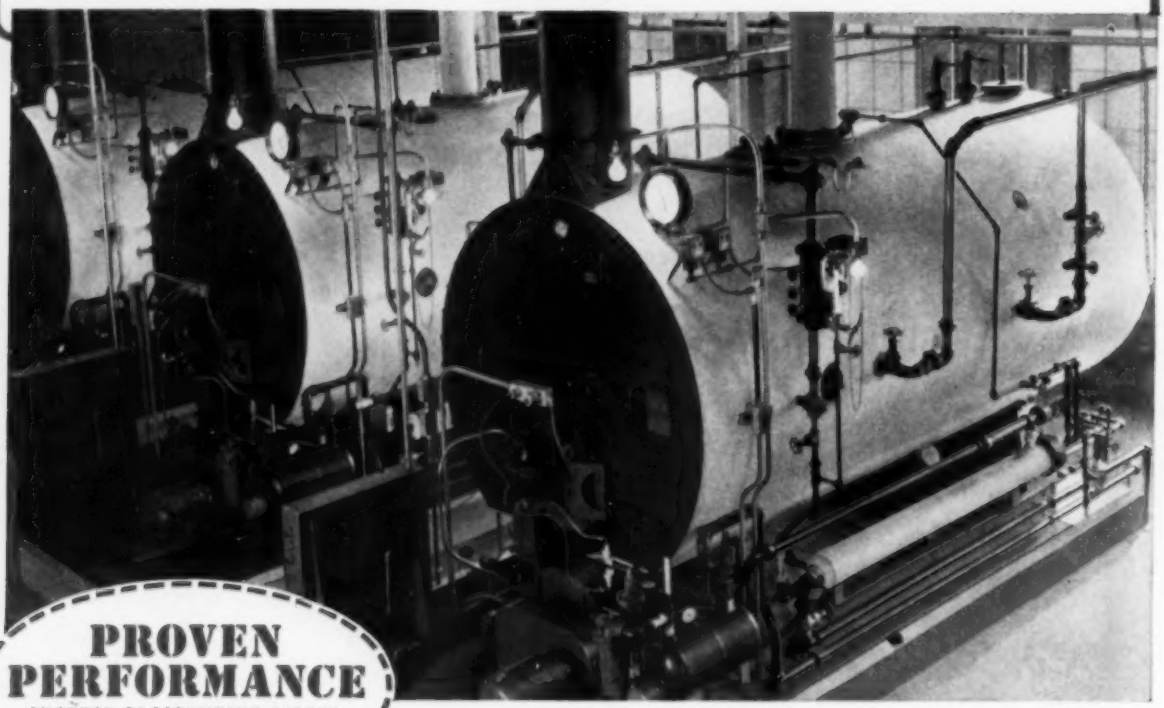
Harry A. DeButts
President

THE SOUTHERN SR SERVES THE SOUTH

SOUTHERN RAILWAY SYSTEM

WASHINGTON, D. C.

Cleaver-Brooks boilers save $25,000 per year for Hoosac Mills...pay for themselves in 2 years' time!



PROVEN PERFORMANCE

ANOTHER OUTSTANDING REPORT FROM A CLEAVER-BROOKS OWNER

After installation and starting service was completed, a check was made on boiler output. Tests indicated efficiency exceeded the guaranteed 80%. After eight months' operation without tube cleaning, stack temperature showed no noticeable gain, indicating high efficiency had been maintained. *Planned and installed by Frank I. Rounds Co., Newton Highland, Mass.*

INSTALLING 3 Cleaver-Brooks self-contained boilers at Hoosac Textile Mills, New Bedford Division, was a major step in ending boiler worries. Hoosac can count on yearly savings of $25,000, and they're set up for future expansion as well.

Before deciding what type of boilers to install for replacing old, hand-fired boilers, Hoosac carefully considered these factors:

1. **Efficiency of steam generation** — the cost for supplying 12,000 lbs. of steam required each hour at peak capacity for heating and processing.
2. **Saving labor costs** — through safe, automatic operation.
3. **Cleanliness** — important to textile manufacture.

A study of past performance and prominence of similar units in the industry — showed that Cleaver-Brooks self-contained boilers would fill the bill.

Guaranteed 80% thermal efficiency was one of many influencing factors in selecting the 3 Cleaver-Brooks 150 hp. boilers. Even with loads as low as 30% of rating, these boilers operate with a flat 80% efficiency. (Hoosac operates their plant over widely fluctuating loads, particularly in summer.)

That they attained their objectives is borne out by these results — *results which showed the boilers paid for themselves in 2 years' time.*

1. **$15,000 savings in fuel** — fuel cost studies showed 275,000 gals. of oil at 5½¢ per gal. provide steam for a year's operation. Same steam formerly required 2,000 long tons of coal at $15.00 per ton.
2. **$10,000 savings in labor costs** — fully automatic operation minimized boiler maintenance. Personnel were then available for productive plant work.
3. **Cleanliness** — modern boiler room proved more efficient than previous cluttered arrangement. Hand firing, removal and disposal of fly-ash was eliminated.

In addition to these substantial savings, the installation provided for economical future plant expansion. At present, boiler operation is rotated so all three periodically receive the same service and maintenance.

Cleaver-Brooks boilers are showing similar savings in many other businesses. Investigate — write for Catalog AD-100 and complete information on standard size oil, gas, combination oil/gas fired Cleaver-Brooks boilers, 15 to 500 hp., 15 to 250 psi.

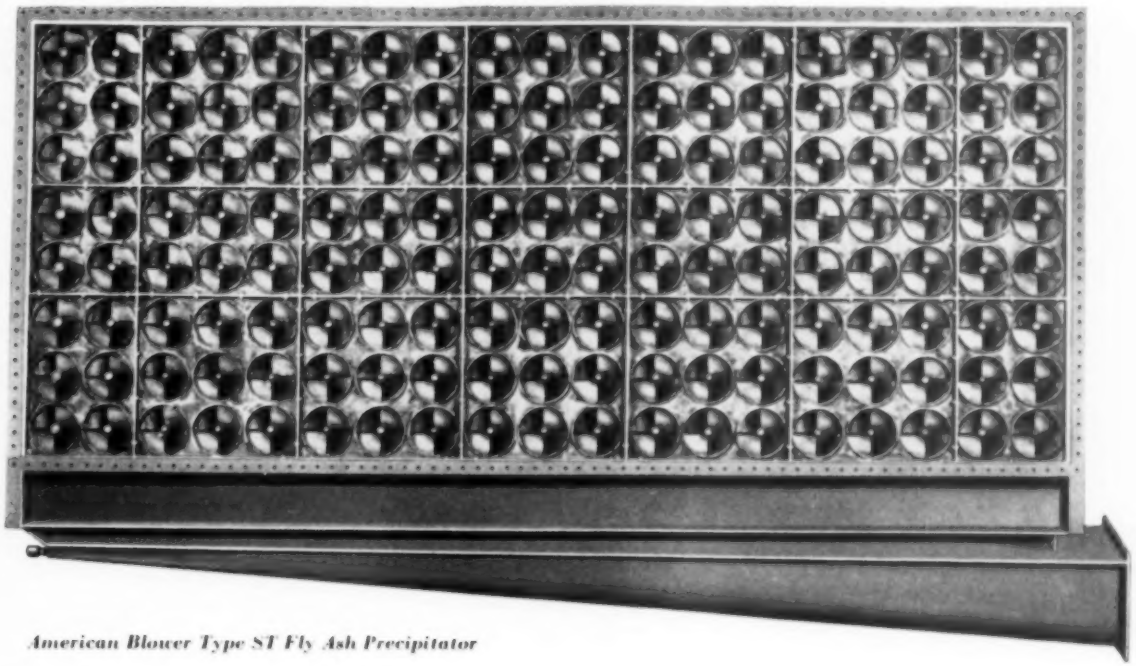
CLEAVER-BROOKS COMPANY
Dept. D—305 E. Keefe Ave.,
Milwaukee 12, Wis., U.S.A.

Cleaver-Brooks

ORIGINATORS OF THE SELF-CONTAINED BOILER

Steam Boilers • Oil and Bitumin Tank Car Heaters • Distillation Equipment Oil and Gas Fired Conversion Burners

American Blower . . . a time-honored name in air handling



American Blower Type ST Fly Ash Precipitator

Memo to Power Plant Men—

In collecting fly ash from pulverized fuel-fired or stoker-fired boilers you'll have a higher efficiency curve over a wider range of operation if you install American Blower Type ST Fly Ash Precipitators.

AMERICAN BLOWER

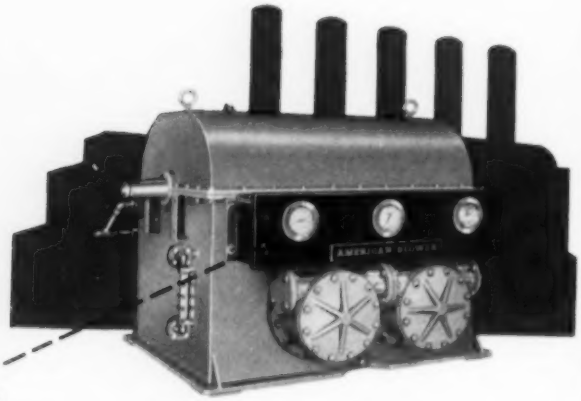
AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

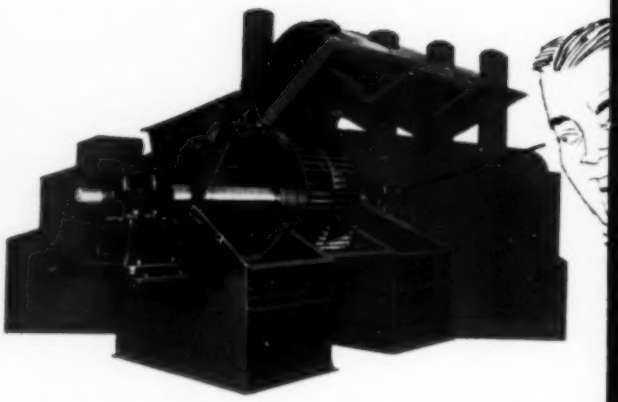
Serving home and industry

AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE • DETROIT CONTROLS • KEWANEE BOILERS • ROSS HEATER

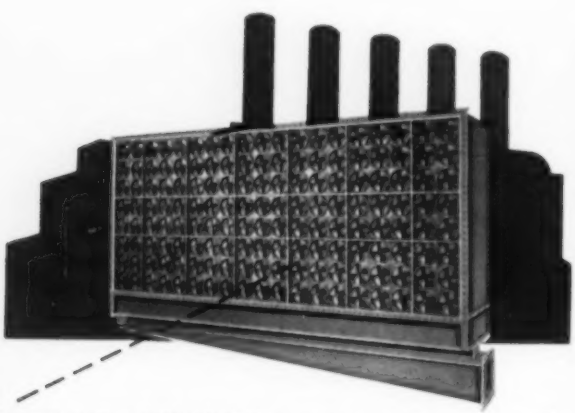
It all depends on how you look at it



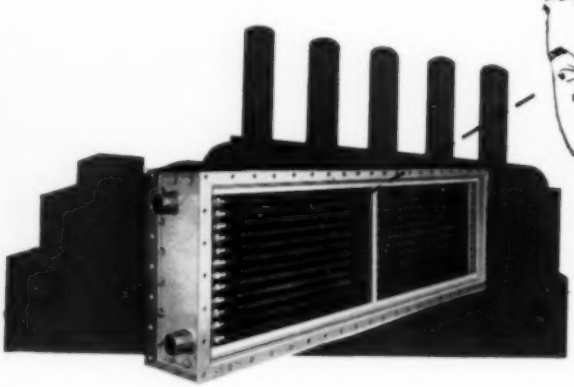
TO A CONTROL MAN this American Blower Class 6 Gýrol Fluid Drive, for flexible control of boiler feed pumps, looms up as big as this in relation to a power plant. He sees, too, American Blower Class 4 Fluid Drive for fan control.



TO A MECHANICAL DRAFT MAN a Sirocco Multi-Blade Fan, which delivers more gas per revolution than any other type, takes *this* proportion in the picture. He could see an American Blower HS Fan equally large if thinking of forced draft.



TO A FLY ASH EXPERT an American Blower Type ST Fly Ash Precipitator looks like this in relation to the rest of the power plant. Little wonder, for the Precipitator lifts a load off his shoulders and minimizes a nuisance.



TO A COIL MAN American Blower Heavy Duty Steam Coils would appear like this in his power plant picture. He likes their great strength, easy accessibility and the way they withstand the high pressures of heavy loads.

Looking at your complete power plant picture, we believe you'll find, as hundreds of others have, that all these American Blower Products improve over-all power-plant efficiency and insure years of dependable operation. Call our nearest Branch Office for complete data.

AMERICAN BLOWER

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of American Radiator & Standard Sanitary Corporation

Serving home and industry

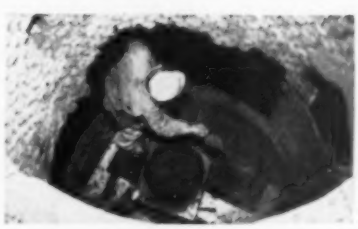
AMERICAN-STANDARD · AMERICAN BLOWER · CHURCH SEATS & WALL TILE · DETROIT CONTROLS · KEWANEE BOILERS · ROSS HEATER

Johns-Manville Insulations save industry a billion dollars in fuel every year!

Reduce your fuel costs and build better furnace linings with JM-3000 INSULATING FIRE BRICK

HERE'S THE ONLY insulating fire brick that withstands a full 3000F. It's highly efficient both as an exposed refractory lining or as back-up insulation. And JM-3000 is only one of six types of Johns-Manville Insulating Fire Brick made for these applications. All provide long-life insulation. All are light in weight, have low conductivity, high structural strength. These properties permit thinner furnace walls—yet you can achieve important fuel savings and increased production, because J-M Insulating Fire Brick assures quick furnace response.

Sil-O-Cel* Insulating Brick is another outstanding J-M fuel-saver . . . a high load-bearing brick for back-up insulation behind refractory linings. It comes in three types, for service through 2500F—makes it possible to reduce the necessary thickness of refractory linings as much as one-third.



Save fuel with J-M Hydraulic Setting Refractories

Johns-Manville refractories meet every need for castable, troweling and gunning applications for temperatures through 3000F. *Firecrete*® is used to cast special shapes of all kinds. It is ready for use within 24 hours, has negligible shrinkage and high resistance to spalling. *Blazecrete*® is used to build and repair furnace linings. When gunned, it adheres readily with a minimum of rebound loss. When slap-troweled, it eliminates laborious ramming and tamping.

Save Fuel with J-M Aggregates and Fills

These lightweight insulations are used as fills to conserve heat in irregular spaces where other forms of insulations cannot be economically applied. They are also used as aggregates for mixing with other materials to form insulating refractory concrete.

*Reg. U. S. Pat. Off.

Send for your free copy! This new booklet IN-115A gives full details about J-M insulating materials for service through 3000F. To find out how they can help cut your fuel costs, simply mail coupon.

JOHNS MANVILLE JM PRODUCTS

Johns-Manville

***FIRST IN* INSULATION**

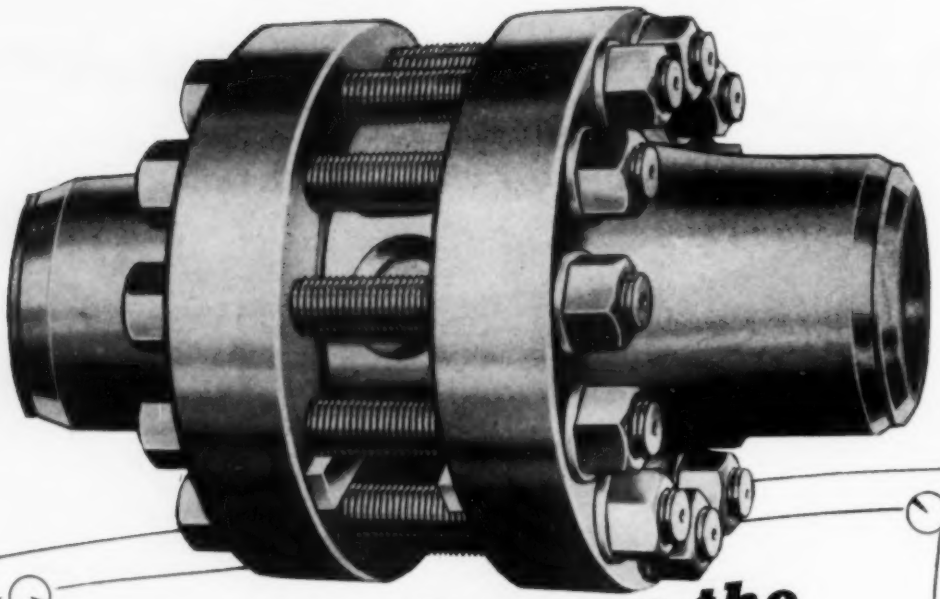
Johns-Manville, Box 60, N.Y. 16, N.Y.
(In Canada, 199 Bay St., Toronto 1, Ont.)
Please send me, without charge, copy of brochure IN-115A

Name_____

Company_____

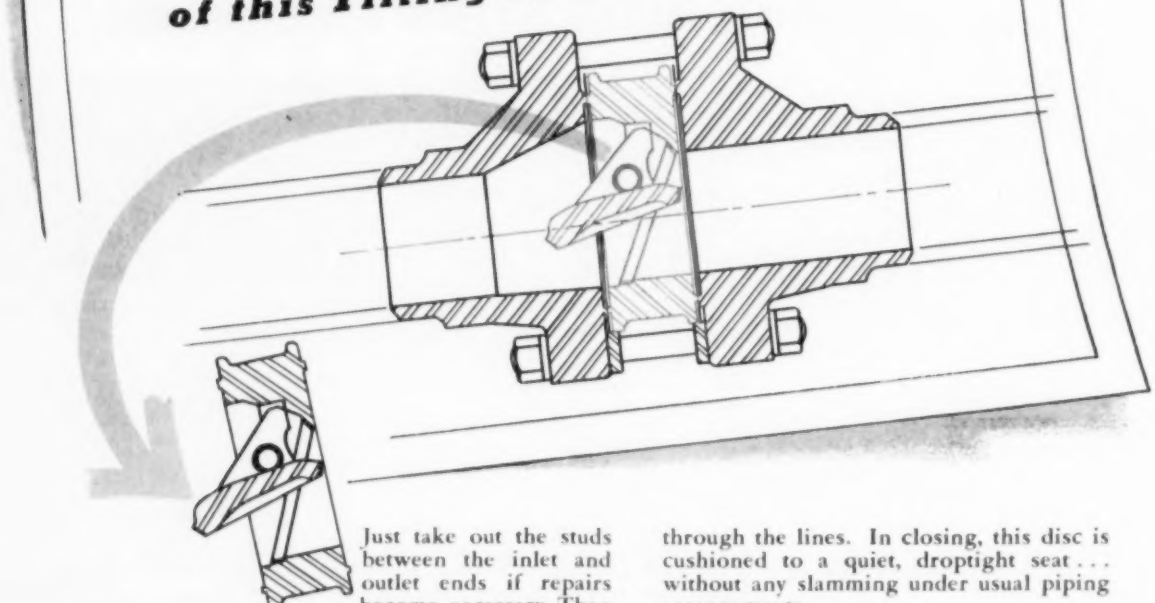
Street_____

City & Zone_____ State_____



You Can Remove the Center Section

of this Tilting Disc Check Valve



Just take out the studs between the inlet and outlet ends if repairs become necessary. Then the entire center section can be replaced . . . quickly and easily. No need to cut the valve out of a welded line.

The Tilting Disc Check Valve has the advantage of smooth, easy operation because of the balanced disc, which rides steadily and without fluttering in the flow through the lines. In closing, this disc is cushioned to a quiet, droptight seat . . . without any slamming under usual piping arrangements.

Chapman Tilting Disc Valves are also available in the standard two-piece design, in either iron or steel, for all pressures. Write for full details and prices to

The Chapman Valve Mfg. Co.
INDIAN ORCHARD, MASS.

CHAPMAN 3-PIECE (TILTING DISC) **CHECK VALVES**

Timely Comments

Be Less Eager for Handouts—OF OUR MONEY

WE SHOULD get away from the idea of always letting Uncle Sam do it. "We must show less eagerness for handouts—of our money—from the Federal Government," emphasizes Allan Shivers, Governor of Texas. His excellent comments on "Let's Bring Government Back Home" are featured in this issue of SP&I—No. 5 of a series on problems of business and government.

This is How It Should be Done

Last year out in West Texas, citizens of Odessa, Big Spring and Snyder put the finishing touches on a $12 million dam on the Colorado River which will supply their rapidly growing water needs for at least 30 years. Project was undertaken WITHOUT FEDERAL AID and WITHOUT imposing ANY TAXES. It was financed by revenue bonds to be paid off with receipts from the sale of water.

These three Texas cities went ahead on their own initiative. Result—a complete integrated water supply system at no cost to the taxpayers of other cities and built on a foundation of individual responsibility.

North Carolina Rejects Federal Aid

Recently, the Greensboro, N. C., Chamber of Commerce went on record against use of federal aid of any kind for a water reservoir badly needed by Greensboro, High Point and Winston-Salem. (It would have been far easier to decide otherwise. For the federal government plans to sell its abandoned High Point hydroelectric power project including 17,000 acres of Yadkin River land.)

Greensboro might have asked Congress to donate the land toward a water reservoir, or it might have asked for federal money to build the reservoir—or both. Instead, it asked only that Uncle Sam hold off public sale until an engineering study of the reservoir project can be made and legislation obtained from the N. C. General Assembly to acquire the land. Then, presumably, the three cities will finance the project themselves.

We regret that such methods of providing for local needs are rare enough to be newsworthy. But, we are proud to be able to point it out and say: *This is how it should be done.*

Are we expecting too much of responsible businessmen and industrial executives when we ask that they make this kind of action commonplace? Should these West Texans and Carolinians be so highly commended merely because they refused to ask other sections of the nation to pay their local obligations?

For the present we must answer, Yes! But we look forward to the time when no community will create "news" by merely doing what they ought to do.

TIME FOR ACTION

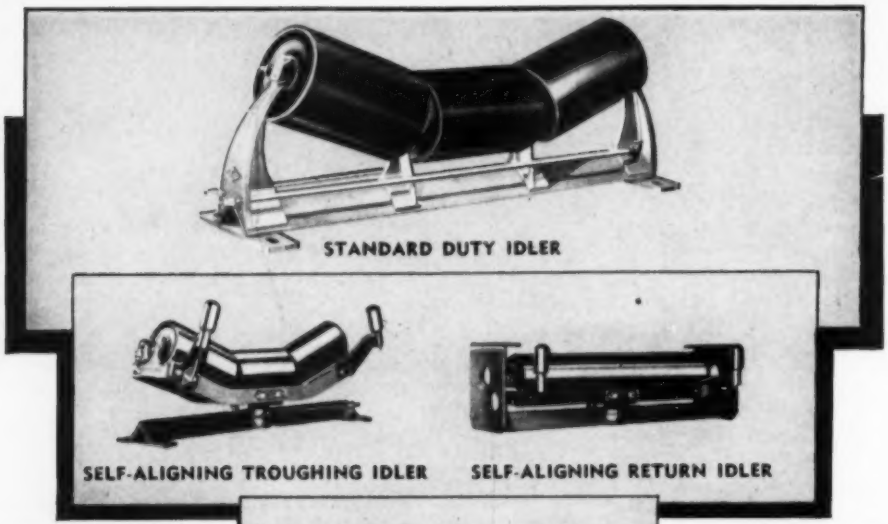
Read, Write and Talk About It

Something can be done about those handouts and bringing government back home. Industrial and power plant personnel throughout the South and Southwest must make their wishes known to their congressmen. We must not allow ourselves to become complacent, thinking that the election of a new administration has solved all our problems.

The election did accomplish a great deal: it has created an opportunity to stop and perhaps reverse the recent headlong trend toward Big Government—if we'll take advantage of it.

This issue of SP&I contains an important article on "Let's Bring Government Back Home" by Allan Shivers, Governor of Texas, and an outstanding opponent of continued expansion of centralized government. Read it carefully, formulate your own views and make them known to your congressmen. Note that free reprints of "Let's Bring Government Back Home" are available—write Southern Power & Industry.

THERE'S A *Continental* IDLER for every purpose



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Industry Speaks

Draftsmen Now STRIPPING THE FRILLS

MANUFACTURING personnel are not the least bit interested in fancy drafting technique nor in beautifully executed time-consuming layouts. What they want is complete, concise, accurate information at the proper time.

General Electric reports that their draftsmen are being encouraged to STRIP THE FRILLS from their drawings. Studies indicate a time saving from 20 to 50 per cent. More time is then available for the most important part of any industrial draftsman's job—productive effort of creative thinking.

Extra views, unnecessary elaboration, superfluous lines, repetition and conventional representation instead of symbolism are a few of the examples of work that never should have been done. The direct way, the simple way, are encouraged as the best way.

The new ideas on modern industrial drafting are being presented personally to all draftsmen in the company. Experts are going from department to department with a planned program. Many of the methods taught in simplified drafting are not entirely new. They have been advocated for ten or more years, but only recently were they wrapped up into an attractive program that was easily presentable and more readily understood.

Impetus to Program

The manpower shortage gave impetus to the program. Casting around for more draftsmen, the question was raised as to where to find them. "Largely, help ourselves," was the answer from John Horn, manager of the general technical services section, who is responsible for the recruiting and training of semi-technical personnel.

He suggested that self-help must come through analyzing operations and rearranging essential work to remove non-technical details from the daily tasks of technical people. He further urged that designers and draftsmen drop the outmoded textbook practices and artistic drawings with their superfluous lines and use today's streamlined industrial drafting techniques to produce quicker results. Men working with the program see no reason for yards of drawings when a few feet will serve the purpose.

In one instance, a drawing which required 57 sq ft of drafting paper was replaced by one with less than 4 sq ft without losing clarity or accuracy. The former required 8 days of one man's time while the less than 4 sq ft of drawing required only 2 days for one man—a saving of 75 per cent.

Both drawings tell the same story—the larger drawing required 57 sq ft of drafting paper and 8 days of a man's time. The smaller drawing took 2 days and required less than 4 sq ft of paper.

Practices Easily Applied

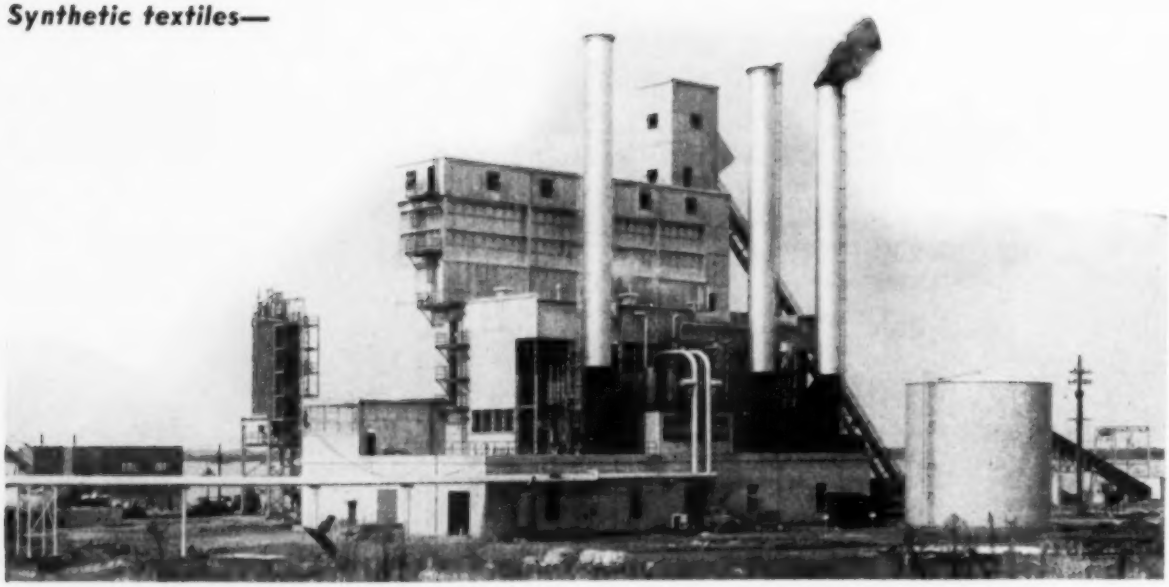
Simplification of delineating, elimination of non-essentials and extensive use of free-hand drawing are being encouraged. This means eliminating those things which add nothing to their accuracy, completeness, or clarity. If a description will suffice, then a drawing is not needed and the draftsman is urged not to draw one.

Another modern and time-saving drafting practice which the company's draftsmen are being urged to use whenever possible is the extension of free-hand drawing beyond its present narrow limits.

Tests have proved that free-hand drawing, when used judiciously, is both practical and economical. With all factors made equal, actual drawing time for the average draftsman is reduced between 20 and 30 per cent.

General Electric draftsmen are being cautioned that the use of short cuts or abbreviated methods does not relieve them of their obligation to draw clearly, legibly and in a manner easily understood. Simplified drawing is not a license for careless, sloppy or indifferent work.

Synthetic textiles—



Central heating and power plant for The Chemstrand Corporation's Alabama operations.

Steam and Water Supply

For The Chemstrand Corporation, Decatur, Alabama

Steam and water are important factors in processes that produce ACRILAN, newest member of the acrylic textile fiber family.

SCIENTISTS called upon nature for the raw materials and terminology—and drew upon nearly 300 years of experience—to develop the new acrylic textile fiber Acrilan.

The Chemstrand Corporation was organized in March 1949, as an associate company jointly owned by Monsanto Chemical Company and American Viscose Corporation, to carry forth research and development, and to manufacture synthetic fibers.

A team set out in June 1950 to locate a site for the company administrative quarters, multi-unit research center, and Acrilan production facilities. The site was secured the following October three miles west of Decatur, Alabama, on a 700-acre tract along the Tennessee River.

Construction of the 14 buildings comprising this installation was started in February, 1951 and 18 months later the facilities were virtually completed. The plant has an initial capacity of 30,000,000 pounds of Acrilan staple annually, and with the research center and offices will employ approximately 1,000 men and women representing a wide diversity of experience and professions. The company is also building a large nylon fiber plant near Pensacola, Florida.

Several interesting steps are involved in the production of Acrilan. The combination of natural gas and air through six basic processes produces a spinning solution having a consistency and color similar to liquid honey.

The basic chemicals are manufactured in Texas. Natural gas and air are combined to form ammonia, then natural gas and ammonia are combined to produce hydrocyanic acid. Natural gas itself is elevated in temperature and pressure to form acetylene. Finally, acetylene and hydrocyanic acid form acrylonitrile.

The liquid acrylonitrile is shipped to the Chemstrand Acrilan plant at Decatur, Alabama, where it is polymerized—the individual molecules combined to form very much larger linear molecules—and reduced to a white powder, having the appearance of talc. This powder is dissolved to form the spinning solution. Forced or extruded through spinnerettes, the fiber emerges in the form of continuous filaments for further processing. The final step involves cutting the filaments into staple lengths, fluffed or

opened, and baled for shipment to textile mills.

The "plus values" of Acrilan add a brilliant chapter to the story of chemistry's achievement in textiles. Superior dyeability in a wide range of rich colors, and bulk-without-weight are among the most important qualities of the new synthetic fiber.

Acrilan retains pleats or creases through repeated washing with a minimum of upkeep. Because the fiber is a thermoplastic, fabrics can be heated, set into pleats or creases, and allowed to cool. Water will not cause distortion as the fiber has extremely low moisture absorption. Therefore it has good resilience, which produces wrinkle shedding characteristics.

Acrilan has the lowest specific gravity of any textile fiber and affords excellent warmth in winter weight fabrics. Yet, in open construction, garments can be made cool and light for summer wear.

The fiber makes a poor diet for moths and other insects, and will not support mildew or fungi growth. It is unaffected by a wide range of chemicals and greases and is easy to clean by washing or standard dry cleaning methods.

STEAM PLANT EQUIPMENT

THE BOILER house is located approximately 500 ft from the shore of Wheeler Lake which is formed by backwaters of the Tennessee River. The building is a steel reinforced concrete structure with brick and corrugated asbestos siding, semi-enclosed type.

Since electric power for manufacturing processes is purchased, the boiler plant is required to supply steam only for processing and heating. The only turbine-generator is a 20 kw unit which starts automatically to supply emergency power for stoker drives and essential lighting, in case of interruption of the purchased power supply.

Steam Generators

Steam is supplied by three Foster Wheeler two drum, water wall, steam generators, rated at 100,000 lb steam per hr, with a peak capacity of 120,000 lb per hr for three hours.

Superheater outlet is at 275 psig and 500 FTT. Extended surface economizers are installed.

Provision is made for future installation of another complete boiler unit of the same size in the present building. Also, provisions have been made for extending the present boiler house for the installation of three 200,000 lb per hr units, which if developed would provide a total steam generating capacity of 1,000,000 lb steam per hr.

Spreader Stokers

American Engineering Company spreader stokers with continuous ash discharge grates are installed. Some of the outstanding features of these stokers include (1) Conveyor type coal feeders prevent clogging on wet coal. (2) Even coal distribution at various loads. (3) Adequate cinder return system. (4) Adjustable overfire air. (5) Ability to handle a wide range of low grade coal.

Overfire air is supplied by an American Blower Company 4,250 cfm turboblower operating at 3600 rpm. It is driven by a 25 hp motor. The overfire air jets are located on sides and backs of the furnace.

Dust Collector

The dust collector is designed to handle a maximum of 165,700 lb per hr of flue gas at 357 F, with a maximum expected draft loss of 1.2 in. WG. A secondary air fan with 3000 cfm capacity at 2130 rpm is employed. A secondary cyclone and fly ash storage is provided and the reinjection system returns cinders and fly ash to furnace through injection nozzles.

Forced Draft Fans

The forced draft fans manufactured by Green Fuel Economizer Company are the double inlet type, and are driven by Whiton direct connected steam turbines. Steam supply is at 275 psig and 500 F, and exhaust is 10 psig. Test block capacity is 173,000 lb per hr at 80 F, against 4.80 in. WG, requiring 49 hp at 1540 rpm.

Induced Draft Fans

The induced draft fans manufactured by Green Fuel Economizer

Recent aerial view of The Chemstrand Corporation, Decatur, Alabama, shows corporate administrative headquarters building (center), multi-unit research laboratories (left), and Acrilan acrylic fiber manufacturing plant, chemical intermediates area, polymer building, power house and other facilities (right and background) now nearing completion along the bank of the Tennessee River.

Company are of the double inlet type, with a dual drive consisting of a Whiton direct connected steam turbine and a General Electric squirrel cage induction motor. Test block capacity is 207,000 lb per hr of 357 F flue gas against a static pressure of 12.25 in. WG, requiring 196 hp at 880 rpm. Damper control is provided for induced draft fan regulation.

Combustion Controls

Combustion controls provided by Bailey Meter Company provide complete automatic control for three steam generators, with remote manual control of each item, including a control panel for each boiler, boiler instrumentation and master supervisory control panel.

Air Compressors

Three Chicago Pneumatic Tool Company air compressors are provided. Two of these are driven by 20 hp, 1800 rpm motors and the other is driven by a steam turbine. One motor driven compressor is used for instrument air, and the other for miscellaneous air. The steam unit is for emergency use in case of power failure.

Feedwater Controls

Feedwater is regulated by a Bailey three element control, responsive to steam flow, water flow, and drum water level. The boiler feed pumps operate at constant speed, and pressure drop across the feedwater regulating valve at a steaming rate of 120,000 lb per hr, and with valve wide open, will not exceed 25 psig.

Heat Balance Control

Heat balance is controlled by a comparatively new method employing Bailey Meter Company equipment, so designed that any one of the dual driven induced draft fans can be used to pass the required quantity of exhaust steam to the deaerator for feedwater heating for any given flow of feedwater. This is accomplished by controlling the steam passed to the turbine by means of a deaerator pressure controller that positions a control valve in the steam line to the turbine.

If the quantity of steam in the deaerator is insufficient for required fan horsepower, an induction motor driver will supply the necessary extra power. If the quantity of steam passed through the turbine is larger than that required to drive the fan, the induction motor acts as a generator and feeds power back into the plant electrical system. If the maximum quantity of steam passed through the turbine (or turbines) is insufficient to satisfy deaerator steam demands, the pressure reducing valves cut in, in sequence.

Boiler Plant Water

All water used in the boiler house is received from the city of Decatur. Water is delivered to the equipment by three, 3 in. single stage pumps, two of which are driven by 20 hp motors, and the other by a Coppus horizontal steam turbine. A reserve 250,000 gal city water storage is provided outside the building for emergency raw water supply.

Water Softeners

Filtered Tennessee River water is suppled by the city and fed to the softeners. Space has been allowed for future sand filters in case it becomes necessary to use Tennessee River water directly.

Major equipment consists of: two hydrogen zeolite softeners, two sodium zeolite softeners, one degasifier, one dilute acid mixing tank, two brine measuring tanks, multiport valves, blending controls, and instruments. Present capacity of the installation is 200,000 lb per hr, and provision is made for future expansion.

Treated water from the softeners goes through the degasifier to a 350,000 gal storage. Three treated water pumps, manufactured by Pacific Pumps, Inc., are the vertical single stage type, with 10 in. discharge. Two of the pumps are driven by Westinghouse 25 hp vertical hollow shaft motors and the third by a Coppus vertical turbine.

Treated water is pumped to the vent condenser and deaerating feedwater heater by treated water pumps, to provide the additional water required to the heater and not received as condensate return. The deaerating heater is vertical spray design, with steam scrubber, and provides 400,000 lb water per hr. It is designed for 30 psig operating pressure and was fabricated in accord with A.S.M.E. unfired pressure vessel code.

Feedwater is delivered to the boilers by three multi-stage Allis-Chalmers centrifugal pumps rated at 550 gpm and 850 ft total dynamic head. Two of these pumps are driven by 150 hp motors and one is driven by a 150 hp Terry steam turbine. Treated feedwater is received by the pumps from the deaerating feedwater heater which is mounted at a height sufficient to avoid vapor locks.

Sulphite is fed into the lower section of the deaerator feedwater heater by a Hagen Corporation simplex manajust pump. And, phosphate is fed into the lower section of the boiler drum by three Hagen duplex manajust phosphate pumps.

Blow Down System

The continuous blow down system is of the flash, low level, heat recovery type, with the blow-off flash passing to the 8-10 lb exhaust steam system. The residue passes to waste through a heat exchanger where most of its heat is given up to the treated water make-up which passes through the exchanger on its way to the deaerating feedwater heater. This continuous blow down system is designed to serve three boilers each with a peak of 120,000 lb per hr.

Ash Handling Equipment

A National Conveyor Company intermittent full vacuum ash conveyor system transports the ash in a closed conveyor pipe line from the various points of accumulation and delivers it centrifugally to a separator unit. The discharge of the receiver is directed through a secondary separator unit for separation of the entrained dust in the exhaust air. The discharge of the secondary separator is connected to the National, 3 ft dia., centrifugal air washer unit. A National multijet steam exhauster unit is connected in the piping between the secondary separator and the air washer. This provides the vacuum for the operation of the system when supplied with steam. The air washer is provided with water

sprays to allay the dust and condense the steam introduced through the exhauster unit.

The system operates intermittently, following a conveying cycle of approximately 80 seconds and a dump cycle of 8 to 10 seconds. During the conveying cycle, the steam is introduced to the exhauster unit, creating a vacuum, pulling up the swing doors on the receiver and secondary separator units. This allows air to flow through the conveyor duct and permits the conveying of ash.

At the end of the conveying period, the steam flow to the exhauster unit is cut off by means of the automatically operated steam valves and the vacuum is dissipated, causing the swing gate at the receiver and secondary separator to swing open and discharge the material deposited in these units during the conveying cycle. These cycles repeat continuously and are controlled by a motor operated cam timer.

The main ash line from the pits to the silo consist of an 8 in. pipe, and the branch connections to the stoker sifting hoppers, to cyclone storage, and to the stack, are 6 in. pipe.

The air washer requires 30 gpm of water at 25 psig at the nozzles, and the air conditioner requires 50 gpm of water at 28 psig. Approximately 200 lb of 125 lb steam is required per ton of ash conveyed.

The system discharges ash from the ash conditioner unit in such a condition that it will neither be dry and dusty nor excessively wet, but the proper consistency for loading in railroad cars from the ash silo.

Coal Handling

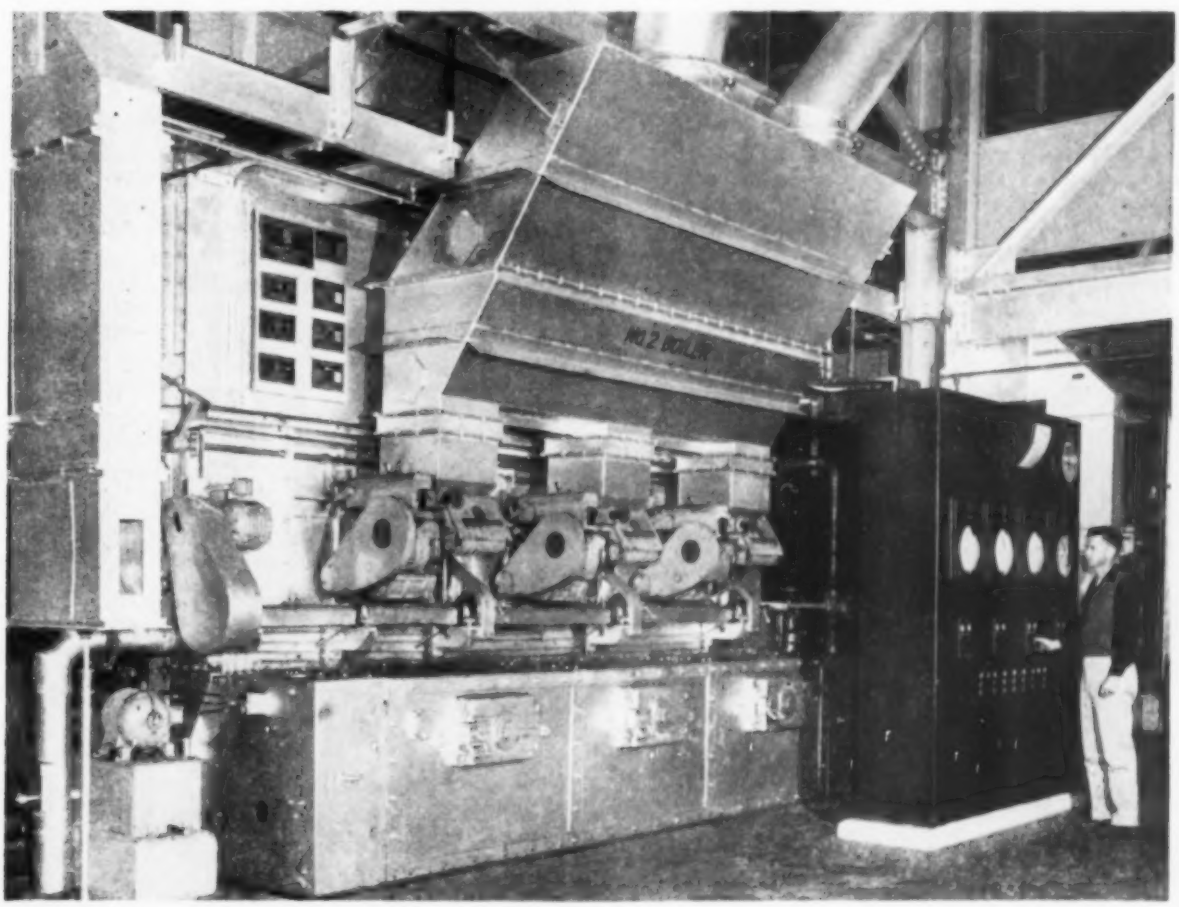
Coal handling equipment was furnished by Beaumont Birch Company. A railroad unloading pit is equipped with car shakeout and spotter. Coal is moved from the pit to the crusher room by a conveyor which bypasses the crusher if coal is right, then to another conveyor that takes it to storage.

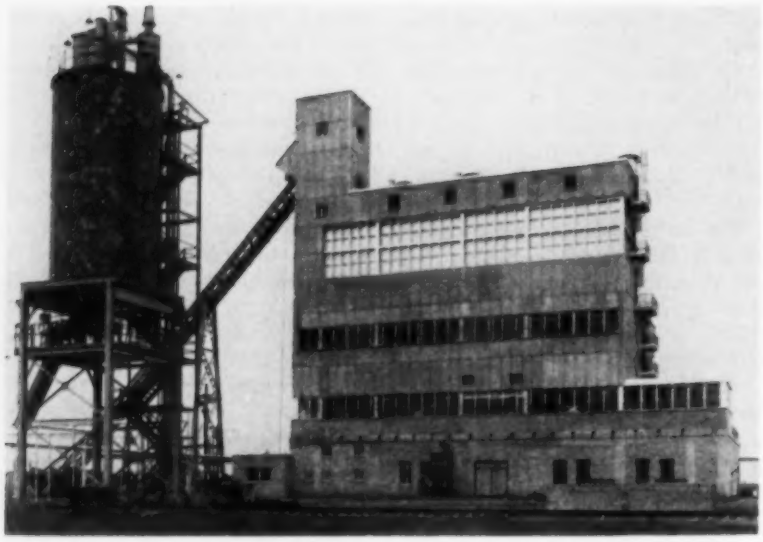
The end of the conveyor is near a tram-hoist pit, and if no coal is needed in the bunker, a bulldozer spreads the coal and packs it in the yard storage. If coal is needed in the bunkers, the tram-hoist car pit is filled from the end of the conveyor, assisted by bulldozer when needed. The tram car takes coal from the pit up an incline to the hopper.

Coal passes over magnetic separator which removes tramp iron, and then goes to a 24 in. belt conveyor which deposits coal in any desired bunker. Each boiler is equipped with 400 tons bunker capacity. Two pipe lines with valves supply each stoker distributor and hopper.

Capacity of the tram hoist system is 100 tons per hr, and pro-

Front view of No. 2 boiler and stoker. Boiler control panel is at right.





The ash silo and handling equipment in foreground, and coal tram-hoist from pit to top of boiler house.

vision is made for addition of equipment for another 100 tons per hr, and a dragline system to move coal from yard to pits.

Process Water

Cooling water for the Acrilan manufacturing processes and water for plant fire protection is supplied direct from the Tennessee River by pumps located in a pump house on the river bank—separate from the boiler house, but supervised by boiler room personnel.

Cooling water pressure control consists of a remote electronic pressure transmitter arranged to control the water pressure in the main production plant which is approximately 2,200 ft from the pump house.

The cooling water pumping station consists of three vertical pumps of 10,500 gpm capacity each. Two pumps are driven by 350 hp 2300 v synchronous motors through magnetic couplings, and the third (standby) is driven by a 350 hp steam turbine arranged to start automatically upon electric power failure. Pressure control will always be accomplished by two pumps provided with magnetic couplings.

The control pressure range is approximately 80 to 130 ft. Electronic pressure impulse as received at the pumping station is converted to a pneumatic loading for positioning an operator which in turn adjusts the rheostat which controls the output of the magnetic coupling.

The first pump is started manually at the pumping station, and then the pressure controller at the pump house takes over and adjusts output of magnetic coupling, and starts and controls the second pump as may be necessary to automatically maintain the required pressure.

Fire Pumps

Two Peerless vertical pumps, 1500 gpm, 240 ft, 1760 rpm supply water for fire protection. One pump is driven by a 125 hp, 1800 rpm motor and the other by a 125 hp, Murray steam turbine. The turbine driven pump may be started by remote control from a pushbutton station in the boiler house.

Electric Power

Electric power is received at 13,200 volts and is reduced to 2300 volts for the river pumping station and to 480 volts for miscellaneous use in the boiler house.

All electric power is purchased from the city of Decatur. Two circuits are provided direct from the TVA system, one circuit from Guntersville Dam, and the other from Wilson Dam. By providing two separate circuits power failures are expected to be reduced to a minimum.

Chemical processing towers and storage tanks.

Modern Industrial Plant
POWER DISTRIBUTION

By GEORGE O. SOWELL

Chief Electrical Engineer, Pathfinder Coach Division, Superior Coach Corp., Kosciusko, Mississippi

Flexible system, designed by Mississippi plant for production line manufacture, maintains power continuity and reduces installation-operating costs.

ELECTRICAL POWER distribution for a modern industrial plant must usually be a matter of compromise. The factors of initial cost, maintenance cost, flexibility, and reliability must all be given careful consideration, as well as the specialized operations of the manufacturing process, structural details of the building, and probable future expansion of the plant.

The construction of the plant of the Pathfinder Coach Division of the Superior Coach Corp., in Kosciusko, Miss., provided an opportunity to design a modern distribution system for a production line type of manufacture.

For several years after the close of World War II, Superior Coach Corp., of Lima, Ohio, studied various areas for a suitable location for a new plant to serve Southern and South American markets for their school bus and ambulance products. In the spring of 1950, they decided on Kosciusko, Miss.

Electrical Load

Electrical facilities for the new plant were required to serve the following loads for this 155,000 sq ft factory and 10,000 sq ft office building: (a) a complete lighting system totaling 355 kw of connected load, and (b) a power system for 900 hp in motors and 600 kw in spot welders.

Initially, the lighting system was designed with a basic 4-40 watt industrial type fluorescent fixture which yielded an over-all average of 15 footcandles in the factory and 35 to 50 footcandles on working surfaces. Due to initial cost considerations, however, 200-watt RLM domes were substituted for each fluorescent fixture in the factory, and half of the fluorescent fixtures were omitted in the general office to bring the cost of the facilities within the allowance for the entire structure.

Distribution

Complete studies of the factory power requirements revealed that machines were widely scattered over a large area. In order to serve these motors with a minimum of expense and voltage drop, the decision was made to locate transformers in the center of four load areas in order to bring the power source nearer the load.

To reduce weight and to allow the transformers to be installed on steel platforms above the floor, thereby reducing floor area required, dry-type transformers were selected. The distribution panels were located on the floor below. Since lighting was likewise widespread and some nine panels were involved in the factory, the lighting was also served from dry-type transformers on the same platforms.

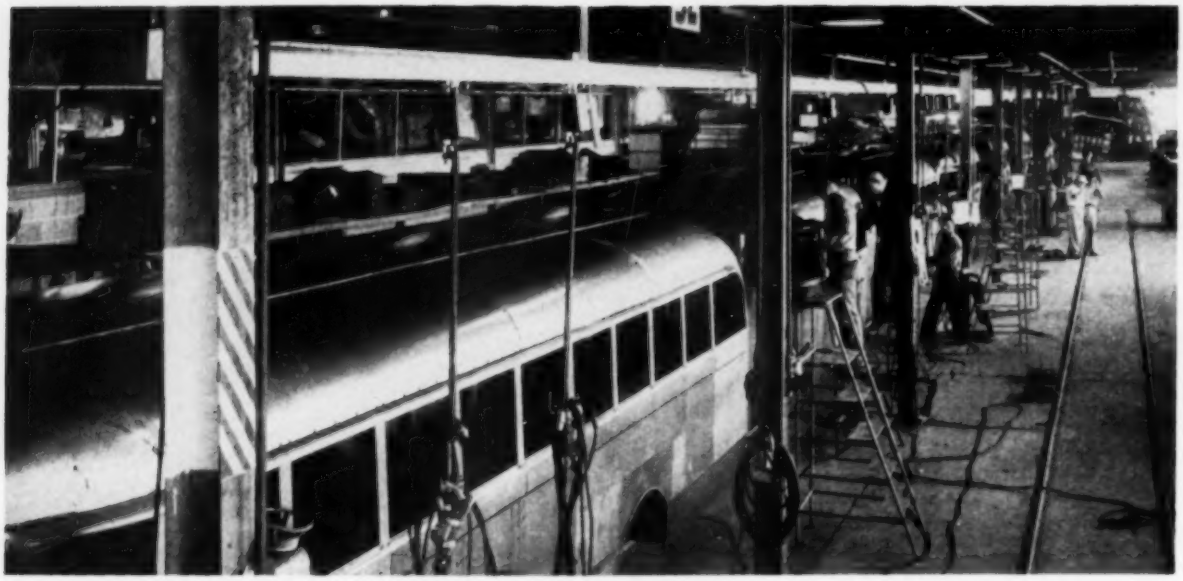
Power transformers consist of three 100 kva, 2400/4160 volts wye primary and 480 volts delta secondary, at each of the four platform load centers. The lighting transformers at each load center are three 37½ kva, 2400/4160 volts wye primary, 120/208 volts wye secondary except at load centers No. 4 which has three 25-kva transformers.

The 2400/4160 volt wye primary was brought into the plant from the utility company's outdoor substation in 350 MCM, 5-kv neoprene-jacketed conductors, installed underground in 4-in. conduit.

Service equipment consists of a General Electric 600-ampere, 3-pole, 50,000 kva interrupting capacity oil circuit breaker. The breaker was installed with 250-ampere instantaneous trips, undervoltage release, and enclosed in a steel cubicle.

From the service equipment, the primary extends to the load centers through four No. 4/0 varnished cambric insulated conductors, rated 5 kv, in 3-in. overhead conduit.

The original design called for two underground service entrances,



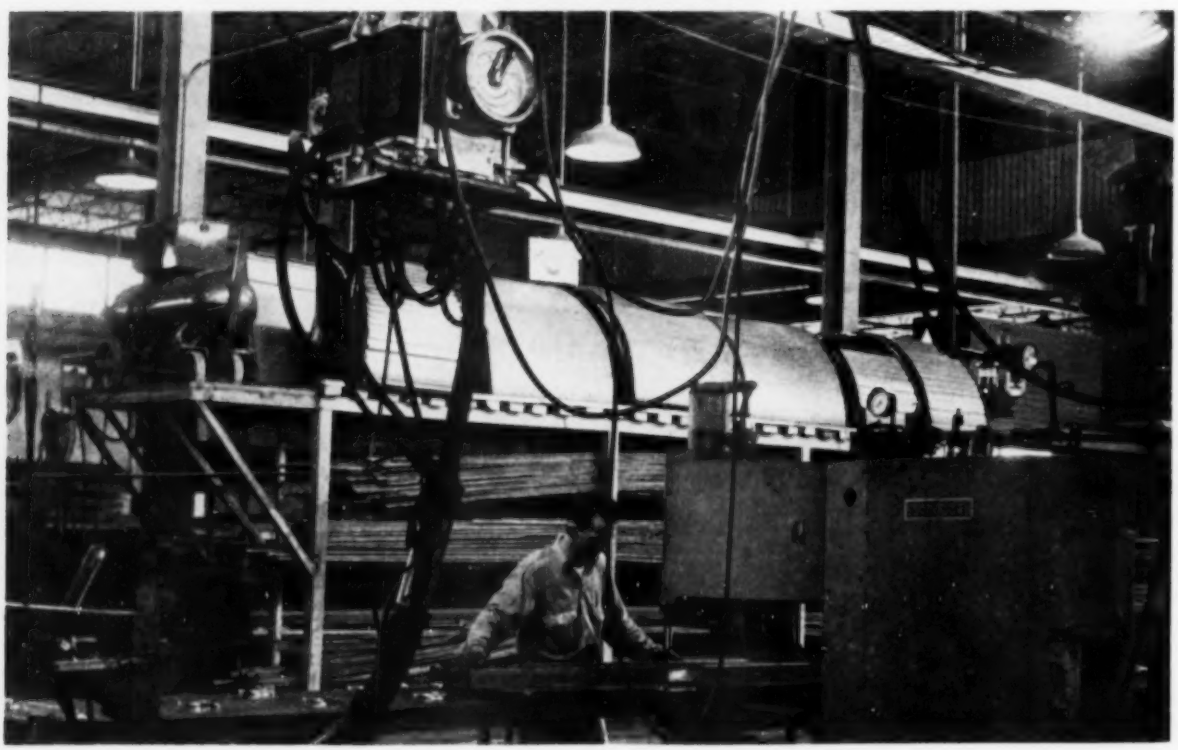
One of the Mississippi plant's modern coach assembly lines. Note Feedrail (just inside columns above the coaches), which supplies the high-cycle hand tools suspended by hooks from the Feedrail sliding contact devices.

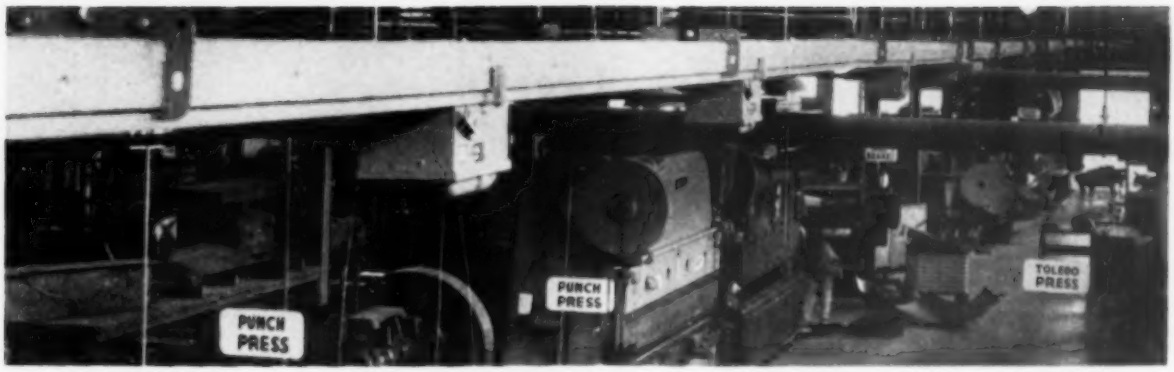
two oil breakers, and a primary loop connecting the load centers. By means of disconnecting switches, any load center or section of the primary could be isolated for maintenance or repair. The power transformers were also designed for banks of three 167-kva capacity. These details fell victim to the tight budget, however, and the installation resulted as described.

Individual single-phase dry-type transformers were selected over polyphase to permit them to be reconnected in case of one transformer failure, and to allow complete interchangeability.

Transformers are protected at each load center by 7,500-volt, 25,000 ampere interrupting capacity boric acid type fused switches in-

Electrical facilities serve a lighting system load of 355 kw, and a power system for 900 hp in motors and 600 kw in spot welders. Power for spot welding machines was obtained by extending busway along the ceiling for the entire length of the plant.





A 400-amp plug-in Trumbull busway extends the entire length of the heavy machine area of Superior Coach Corporation's modern Kosciusko, Mississippi, plant. Installation gives maximum flexibility in production machine arrangement without the necessity of rewiring

stalled in large 14 gauge sheet metal, hinged-door boxes. These boxes are nippled to auxiliary gutters which serve the transformers.

Distribution panels are Swing-Wa switch and fuse type for both lighting and power. Ample spaces were provided for addition of switch units to serve future loads. Main switch units provide protection for each of the panel buses.

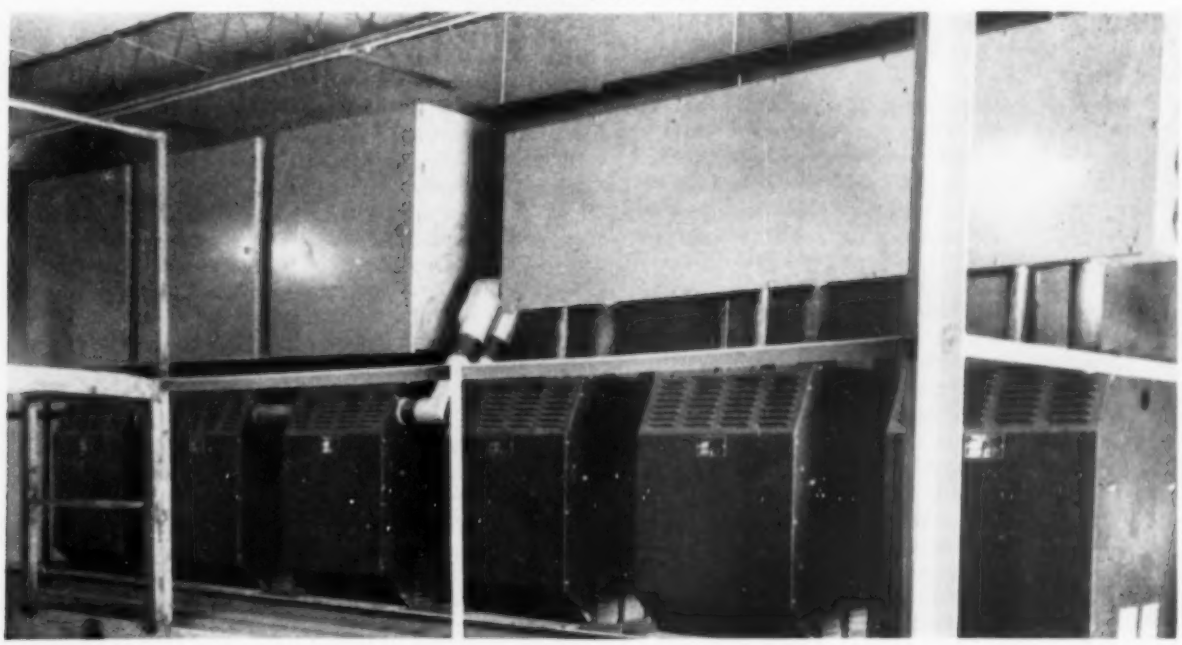
One area of the factory serves punch presses, metal shears, etc., which were movable and therefore especially suitable for service from busway. One straight run of some 330 ft of center-fed 400-ampere plug-in busway was installed to serve these machines. The balance of the motors are served from conduit circuits extended directly from the strategically located load center distribution panels.

Lighting panels throughout the factory are "Quicklag" circuit-breaker type and are used for switching the larger lighted areas. All lighting and power wiring is fully enclosed in electrical metallic tubing or rigid galvanized conduit. Convenience receptacles are of the groundable type for safety.

The office building is equipped with floor boxes to provide 120-volt circuits and telephone service to desks and tables located away from walls. Fluorescent general lighting is installed throughout the offices. An underground feeder from the factory serves the office with power for lighting, convenience receptacles, and for the air conditioning machine, all 120/208 volts, 4-wire, three phase.

The entire plant now establishes a maximum demand of approximately 600 kw, but all facilities installed will accommodate at least twice that amount. This type of system provides complete flexibility at minimum expense in event of future additions of either load or extensions to the buildings. All that would be required is a primary extension and additional dry-type transformers installed where the new load is placed.

To reduce weight and to allow transformers to be installed on steel platforms above the floor, dry-type transformers were selected. Distribution panels are located on the floor below.



An outstanding opponent of continued expansion of centralized government says

Let's Bring

By ALLAN SHIVERS

ALLAN SHIVERS has had a notable career in the service of the Lone Star State. At the age of 26 he was elected to the Texas Senate and served three four-year terms. In 1946 he was elected Lieutenant Governor and three years later he became Governor. In 1951 he was elected Chairman of the Southern Governors' Conference.

No. 5 of a series on problems of business and government

THE PEOPLE of the United States today have a real opportunity to reverse the trend toward Big Government.

For a discouragingly long time we have seen the growth in this country of a feeling of impatience with any limitations on the powers of the Federal Government. We have witnessed the spread of the doctrine that Congress and the President and the Federal Government should have any power they chose to assume—that they should be permitted to coerce the individual citizen to whatever extent they may deem necessary in promoting their own concept of the general welfare.

Now, happily, it seems that the pendulum is poised for a swing in the other direction: away from an all-powerful central government, away from government by executive decree, away from the specious theory of "paramount rights" assumed without benefit of constitutional or statutory provision—away, in short, from Big Government and its attendant evils.

A demand is growing among the people of the United States—and especially among the people of the South—that government be brought back home.

Back home to the states.

Under the basic law of our land, the states have never been in a position of subserviency to the Federal Government. The states are the creators, not the creatures, of the Federal Government. That fact has been too much forgotten.

The doctrine of states' rights is not an empty concept, not merely a topic for speeches by politicians. It is the foundation stone of our whole system of government.

Article X of the "Bill of Rights" of the Constitution of the United States provides specifically and in unmistakable terms that all powers not expressly delegated to the Federal Government remain with the states and with the people. That is one of the fundamental safeguards provided in the Constitution. Another is that which guarantees the individual citizen the free and full exercise of certain rights and protects him against encroachment and coercion with respect to those rights.

It is because of such safeguards as these in the Constitution that the American Government has survived longer than any other government which existed at the time of the document's adoption.

Ours is a government which derives its powers from the governed themselves—from the people. Our Federal Government is not sovereign. Only the people are sovereign in this country. In our Constitution, the American people set up a government of law, not a government of men.

To the extent that we stray from this basic concept, our American form of government is endangered. There has been too much straying from it in recent years.

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Government Back Home!

Governor of Texas

"We must fight to halt the flow of governmental power to the national capitol."

But, say the proponents of an all-powerful central government, conditions have changed along with the times. When the Constitution was adopted in 1787, this country had a population of less than four million and the Union was composed of only thirteen states. The Big Government advocates claim that the men who drew up the Constitution could not have foreseen these changes and would not have presumed to legislate finally for a country which is now composed of forty-eight states with a combined population of more than 150 million.

Is there justification for this claim?

I think not.

We Have a Federation of States

I believe that the framers of the Constitution meant for certain of its provisions to be as rigid as language could make them. I believe that they intended for these provisions to remain unchanged through the years, so long as this nation should endure. It is my considered opinion that these rigid provisions are principally responsible for the survival of our Constitution for one hundred and sixty-five years, making it today the oldest constitution in continuous operation in the world.

The provisions I am talking about are those which set up our government as a federation of states—a Federal Government—and not as a centralized national government.

There are several such provisions. Let us consider just two of them: that providing for amendments to the Constitution and that giving each state equal representation in the United States Senate.

The Constitution provides, of course, that amendments may be submitted to the States by two-thirds vote of each house of Congress. But amendments cannot be put into effect until they have been ratified by three-fourths of the states. It is important to note that this ratification is not by the people of the United States as a whole. Such ratification must come from

the states acting as separate units. In the process, any state has as much voice as any other state, regardless of their respective populations.

The other provision mentioned reads as follows: "No state, without its consent, shall be deprived of equal suffrage in the Senate." That provision, above any other in the Constitution, guarantees that we shall have a federal form of government—that is, a government made up of a federation of states, and not a centralized national government. In the legislative processes carried on in the Senate, as in the ratification of proposed amendments to the Constitution, every state is equal with every other state.

The chief argument made in favor of this form of government, at the time the Constitution was being written, was that this country would expand, that it would grow in area and population, and that only a federated government could survive such expansion and growth. The history of the past one hundred and sixty-five years certainly has proved the soundness of this contention.

If it had not been for these safeguards, our Government would have passed years ago under the control of a baker's dozen or so of the most populous states. Our Constitution and our Government have survived precisely because we have had a federated government, a federation of states.

Framers of Constitution Foresaw Changes

There have been great changes in this country since the Constitution was adopted, certainly; but the greater the changes, the more apparent becomes the wisdom of the authors of the Constitution in making certain provisions inflexible.

In 1887, when our Constitution was a century old, the population of the United States had grown to sixty million people, or fifteen times the population of the country at the time the Constitution was adopted, and the number of states had increased from thirteen to forty-one. Those figures represent tremendous changes. But here we have gone on for another sixty-five years, with the population increasing by 150 per cent and with seven more states added to the Union, without making any fundamental change in our Constitution or in our form of government.

It is a weak case the Big Government proponents advance in support of their theory that the authors of the Constitution would have framed that document differently if they could have foreseen the great changes destined to take place in the United States. The framers of the Constitution did foresee change. They deliberately planned and worked to prepare the Union to meet change without its essential governmental structure being impaired.

The Constitution has been subjected to a terrific battering during recent years. It has been assailed as an obstacle in the path of progress. Its authors have been stigmatized as representatives of privilege. Those who hold an abiding respect for the letter and spirit of the Constitution have been labeled reactionaries. Those who have defended its principles have been termed "economic royalists" and "tories."

In spite of all this, however, the Constitution is still the Constitution. Our Constitution, as drawn up in 1787 and as amended from time to time since then—by the states as separate units—is as much for today as it was for yesterday and will be as much for tomorrow as it is for today.

To the extent that Big Government has led us away from the basic doctrine that this Union is a federation of states, we must fight our way back.

In this fight, the states themselves are in a position of critical importance. Only by bringing government back home can we make certain that the individual and social and economic freedoms guaranteed to us by the Constitution remain in effect.

The states are the battleground on which we must fight to halt the powerful flow of governmental power to the national capitol. We may as well recognize that, regardless of which political party is in power in Washington, we shall have always with us those self-seeking or misguided men who want Washington to fill the role of that well-advertised soap powder which "does everything." It is up to those of us who hold to the traditionally American concept of states' rights to oppose the plans of these men, no matter in what high places they may be seated, no matter what their political allegiance.

The States Have Responsibilities

Along with the assertion of states' rights there must be, of course an assumption of states' responsibilities.

It is vitally necessary that we get away from the idea of letting Uncle Sam do it. We must show less eagerness for handouts—of our money—from the Federal Government, for with the handouts inevitably goes control. We must vigorously and unceasingly resist efforts by any department of the Federal Government to encroach still further on our inherent rights as states; that, indeed, is our basic responsibility.

From my own experience in state government, I should like to add a cautioning thought that the seats of state government must not themselves become miniature Washingtons. The idea of bringing government home to the people should work downward as well as upward. Counties and municipalities within a state have their own rights in respect to local self-government. Those rights should be rigorously upheld and zealously protected by the several state governments.

In working to bring government back home to the people, the states of this Union are simply performing a duty to their citizens and to their businesses and industries. That duty is to maintain the proper perspective as regards freedom of the individual and freedom of business enterprise.

For the individual units of this federation of states, ours is a time of challenge and of opportunity. We can realize the opportunity by meeting the challenge.

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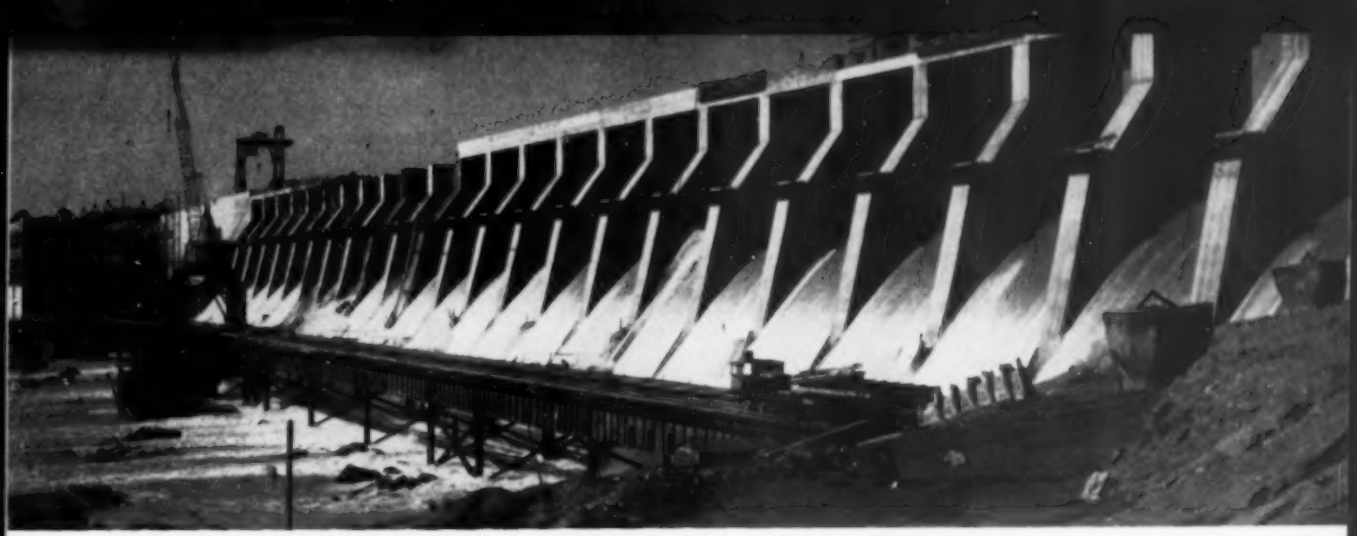


Sinclair Dam and Power House on the Oconee River near Milledgeville, Georgia.

Georgia's Newest Hydro-Plant

Sinclair Dam Provides 50,000 kw at Furman Shoals

ELECTRIC power is flowing into Georgia Power Company's system from the first of two 22,500 kw hydro-electric units at the new Sinclair Dam at Furman Shoals on the Oconee River near Milledgeville, Georgia. The second unit which will bring the total capacity of the new plant up to 45,000 kw will begin operation at an early date.

Built at a cost of nearly $17,000,000, Sinclair Dam will produce approximately 160,000,000 kwh of electric power in an average year. This is more than twice the amount of power required in the Milledgeville-Sparta-Eatonton area, in which the new plant is located.

At normal level the lake behind the dam will have an area of 15,000 acres and a shore line of approximately 420 miles. Water will back up the Oconee River nearly 25 miles to the point where State Highway 16 crosses the river between Sparta and Eatonton. In Little River, water will back up to State Highway 44 between Gray and Eatonton.

Sinclair Dam is 105 ft high and is constructed of concrete with earth-fill abutments. The dam is nearly a half mile in length. It is named for B. W. Sinclair, superintendent of production for the company, a veteran of more than 40 years service who was instrumental in the completion of many of the vast engineering and construction jobs that the Georgia Power Company has undertaken in the past.

Ike Farris, Plant Superintendent, and J. T. Hanie, Resident Engineer, putting the 22,500 kw unit on the line.

Two of the 22,500 kw generators. The far unit is already operating and the other is practically completed.

50 to 200 tons a day in Alabama plant handled by industrial trucks

Clamp Device Permits

VERTICAL STACKING Without Pallets

By stacking paper rolls on end, Bemis Bro. Bag Company slashes storage space needs 20 per cent. Clamp permits vertical stacking of rolls with pallets. On busy days, single Skylift electric truck stores as many as 368 paper rolls.

A 20 per cent slash in paper roll storage space needs has been achieved by Bemis Bro. Bag Company at its Mobile, Ala. plant by using clamp-equipped industrial trucks.

The nine-year-old Bemis plant adopted mechanical handling at the outset. A few years ago, seeing the need for space saving and faster handling of bulky paper, it acquired electric trucks with the roll handling devices. The revolving clamp permits vertical stacking of rolls, without pallets, a procedure which has recovered a fifth of the valuable space initially assigned to roll storage.

Bemis' raw materials are mostly rolls of brown or white kraft paper, or asphalt coated paper, 40 in. in diameter and varying from 20 to 60 in. in width.

On a busy day, as many as 368 rolls have been brought in and stored away by a single Automatic Skylift electric industrial truck, with a clamp attachment, made by the Automatic Transportation Company.

Equipment

The factory, an integrated unit, is one story high except for two temporary storage sheds. The main building measures 180 x 540 ft.

The materials handling fleet includes four Skylifts, two each with 4,000 and 6,000 lb capacities. One of each size is equipped with a roll grab, and an extra clamp unit is kept on hand for use on a standard fork truck when necessary. Removing the forks and installing the attachment is a simple matter.

Incoming paper rolls are handled easily in horizontal or vertical positions with the rotating clamp attachment. Clamp revolves through 360 degrees.

Method

Most rolls are received in horizontal position, but that is not always the case. It is necessary at times to pick up incoming rolls in vertical or horizontal positions, which the revolving characteristics of the clamp makes possible.

By stacking rolls on end, the problem of mixed sizes becomes unimportant. Bemis now can have a stack of paper 40 in. in diameter, extending to the 15 ft. ceilings. Placing rolls horizontally would require adequate floor space for the widest rolls, and would waste a considerable amount of space.

The plant produces Multiwall bags for products such as cement, chemicals, and sugar, along with Deltaseal and Flexicarton bags for such items as rice and salt.

Total handling—including receiving, interdepartmental movement, storage, and shipment—runs spasmodically from between 50 to 200 tons a day, all of it by fork lift or Transporter type industrial trucks.

Runs, which vary with the positions of the stacks, average about 110 ft. Roll weights are from 1,040 to 1,470 lb.

The rotating feature of the clamp, which revolves through 360 degrees, is important in the pro-

duction system, because rolls are laid horizontally for printing presses and tubing machines.

From the raw material storage area, the rolls are taken to the printing department. After the rolls are printed, they are taken to storage to condition and await their turn in production. Those returned to storage are placed in that part of the warehouse closest to the tubing and bottoming department, where they will be moved next.

The rolls going directly to printing are about 20 per cent of the total. The other four-fifths are taken by the lift trucks to the tubers, together with rolls already printed.

Thus, Bemis estimates, up to about 75 rolls a day go by truck from printing to storage and to the first operation, about a 175-ft. move. At the tubing department, the clamp's utility is completed, as the paper tubes continue from there on conveyors. Later, after the bags are ended, they are put on skids

(*Continued on page* 138)

Stop Conference Skipping

REGULAR conferences are an established procedure in most large industrial plants. But the principal advantage of conferences over individual meetings—TIME SAVING—is defeated unless every one remembers to be there on time without a last minute reminder. "Where's Joe?", "Is Pete coming?", is a more or less accepted prelude —and key men are kept waiting while the group gathers.

In most plants some executive assistant is delegated the duty of seeing that all regular conferences are properly scheduled, and everyone notified. But the usual 'notice-in-the-letterbox" method fails to get results. Notice slips are lost or forgotten. So at meeting time someone gets on the phone —.

A special, one sheet, marked calendar has been introduced to solve the problem for one large chemical company. The system is very simple. Here is how it works.

1—From a master "blank" tracing, ozalid reproducibles are made up in the necessary quantities to provide one each of the various types of "filled-in" calendars needed —Fig. 1.

2—The reproducible is marked in pencil with code letters, indicating the date of each regular conference throughout the year, and an explanation of the code is listed at bottom of sheet, Fig. 2.

3—Then prints from the marked reproducible are available to each man expected to attend the regular conferences. Each man knows which conferences he is expected to attend—and the reminder is constantly before him.

Since the "fill-in" on the reproducibles is in pencil, changes and correction can easily be made, and replacement sheets sent to individuals as necessary.

In addition to their principal purpose (explained above) these one sheet reminder calendars have additional advantages. Not only can each individual tell at a glance exactly when he is expected at conference, but familiarity with the code lets him check to see when other conferences are scheduled or in session. This is frequently helpful in connection with interdepartmental work and contacts. Free time for future engagements is noted at a glance.

Each man is encouraged to put additional marks on his own copy of the calendar. He adds all kinds of reminders for himself: trips, inspections, report dates, even his wife's birthday. The more the calendar is used, the better. Marking it and using it should become a habit.

The one-sheet reminder calendar promotes systematic attention to duties, and PROMPTNESS.—*P. H. Kline, Enka, N. C.*

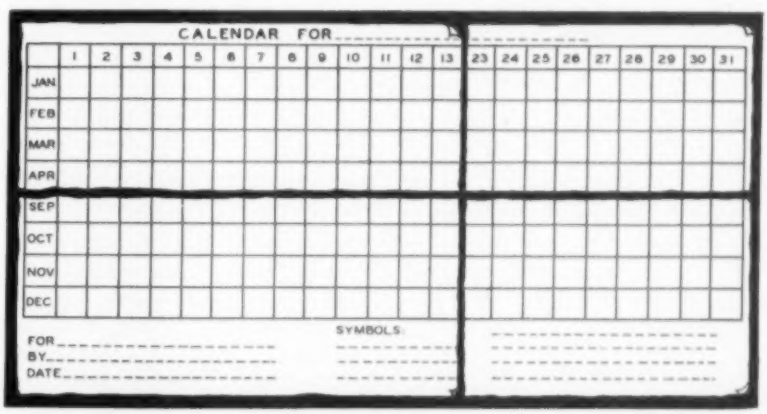
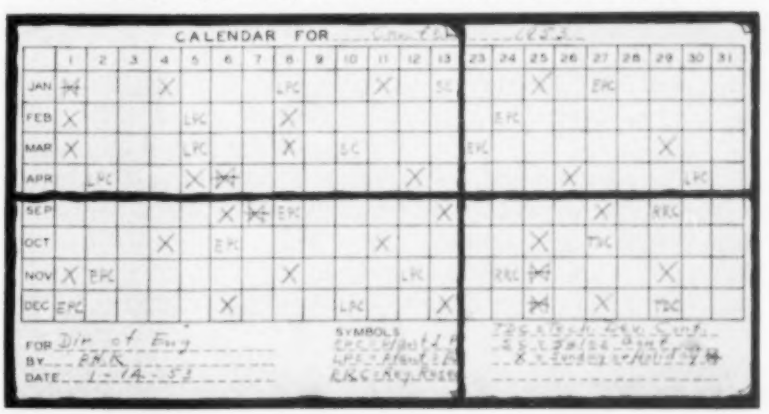


Fig. 1 (above)—master "blank" tracing from which ozalid reproducibles are made up. Reproducible, Fig. 2 (below) is marked with code letters, etc.



Progress in controlling process variables—

The Case of the GRAPHIC PANEL

By R. L. NICHOLS, Division Foreman, Magnolia Petroleum Company, Beaumont, Texas

A progress report on graphic panels, which present a simpified flow sheet of the process, with the major process vessels and equipment pieces represented by suitable symbols.

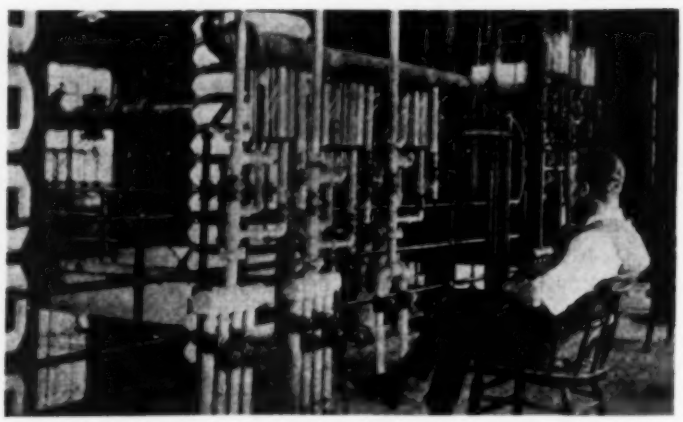


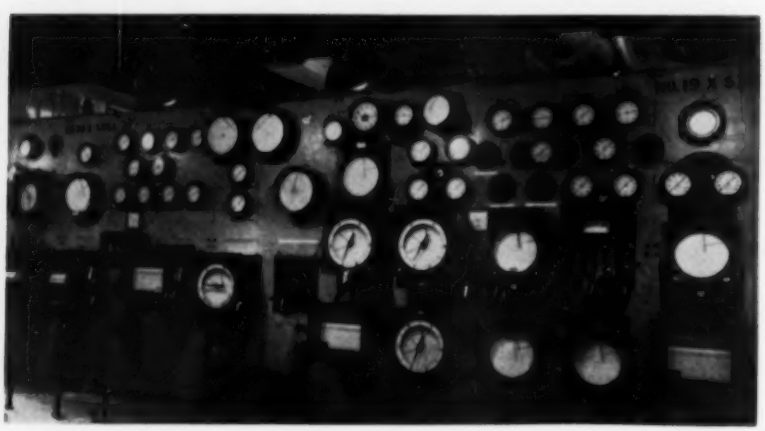
Fig. 1. The ultimate in (vintage 1924) centralized control—operating gallery of a Lummus refinery. All important readings and controls were within easy reach of the operator.

THE GRAPHIC PANEL is but one more step in the centralization and improvement of the control of process variables. Like all preceding steps it is neither the final answer nor the complete answer to all control problems. Indeed, there are places where it is not even a correct answer!

Years ago, when through-puts were small, batch processes the rule, and manpower was cheap and readily available, centralization was not a problem. I recall a certain battery of batch stills at Magnolia had just been brought up to date when I was first employed there. Temperature of the oil in each still was shown on a recorder on the front of the setting where the fireman could watch it as he tended the fires. At the rear of the stills, all product streams were brought through "look-boxes" symmetrically arranged in a "running room," where the stillman could draw samples, and take gravities and temperatures of streams. A battery of stop-cocks on a "rundown manifold" in the "running room" was used to divert the streams to various "stock tanks." Flow rates were judged by the size of the stream in the "look-box," and checked by hourly gauges taken on the stock tanks 300 to 500 ft away. This was modern!

Continuous Systems

Soon batch processes gave way to continuous systems, and the need for closer, more centralized control began to appear. "Look-boxes" were replaced by "Wier-boxes," which offered flow measurement of a sort, and a few temperature recording instruments were added. One refinery, built by the Lummus Company about 1924, came up with the ultimate in centralized control shown in Fig. 1, where all impor-



Material has been adapted from comments on Graphic Panels by Mr. Nichols, presented at the Texas A&M Instrument Symposium, held in January, 1953. Mr. Nichols acknowledged the help of Moore Products Company, Pannellit, Inc., and numbers of his friends in the preparation of the material.

Fig. 2. If you need any argument to help sell a reasonable graphic panel installation, this "visual aid" should be useful. This is an old Cross Unit made over into pipe stills.

The graphic panel is here to stay . . . here are a few advantages and disadvantages

ADVANTAGES

1. Operator can see at a glance all important process variables and their relationship to each other.

2. Without leaving control room, can make any control change necessary and immediately observe effect on other variables.

3. Since operator sees the whole process, he can frequently spot incipient troubles and make corrections before they develop into shutdowns.

4. Remote-set controllers, supervised from graphic panel, provide improved flow control, thus benefiting entire process.

5. Supervisory personnel can easily follow graphic flow sheet and know whether unit is operating normally.

6. Control rooms may be made smaller and less expensive.

7. Instruments are more readily interchangeable, thus tending to reduce both field repairs and out-of-service time.

8. Prefabricated boards easier and more economical to install.

DISADVANTAGES

1. Casual observer, impressed by attractive appearance of panel, is inclined to consider it the final answer to all control problems. This frequently leads to its being installed in places where it is neither economical nor desirable.

2. Designers may become fascinated with panel appearance and sacrifice function for form. Good design considers both front and rear of panel.

3. Failure to consider panel rear while designing flow picture usually leads to a veritable rat's nest of piping and wiring that is difficult to install and thrice difficult to service.

4. Operators tend to confuse panel with process. They develop a tendency to stay always in the control room and thus lose contact with actual equipment.

5. Union labor will frequently refuse to install prefabricated panels.

tant readings and controls were within easy reach of the operator.

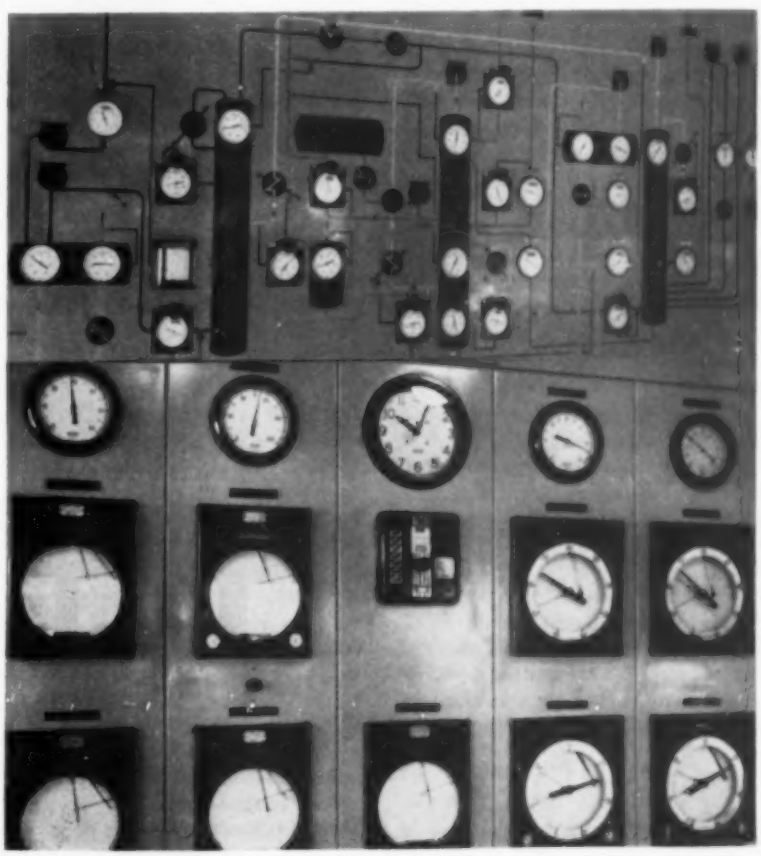
Soon Cross Cracking Units were being built, and furnaces patterned after water tube boilers, complete with cast iron gill rings on the tubes to improve heat transfer, were the order of the day.

Control rooms with truly centralized controls came into being. All pumps were located in the control room, and equipped with gages so that the operator might check pressure conditions on the unit. Charge pumps were simplex plunger type, and flow was regulated by means of a device for automatically controlling the number of strokes per minute. Important control valves on the unit were strategically placed so that extension stems reached into the control room, terminating in large hand wheels. Pneumatic level controls were borrowed from boiler installations and a gage in the house indicated the position of piston-operated on-and-off valves. Millivoltmeter pyrometers, both indicating and recording, brought all important temperatures in to the control board.

Incidentally "cold junctions" were buried 14 ft underground, and "cold junction" compensation was not necessary. Control was really centralized—and so was heat! All instruments, of course, were mounted on the front of the board—no flush mounts were available.

About 1930, a Cross Unit was built in Louisiana, and such complete instrumentation was installed that when Kellog's operating engineers brought the unit on stream it ran for over thirty days without requiring any adjustment by any operator. After the test, some of the instruments were removed in order that the operator might be required to make certain adjustments by hand, and thus *keep in touch with the process.*

A number of Cross Units were later made over by their owners into pipe stills. Obsolete instruments were replaced by later models



Since their introduction to the process industries, graphic panels have survived many variations and phases. One of the still unsettled arguments concerns the amount of detail which should be shown on the control panel. Obviously, the graphic picture should not be crowded to the point of possible confusion.

If the operator can get along without a particular symbol or instrument, then it should not be shown. Note the panel in the above view (Fig. 3)—detail has been added to the point of confusion. By the way of contrast, the lower view (Fig. 4) is a conventional panel on an identical unit—by far the better design in this case.

—still mounted on the front of the panel, with the eventual results shown in Fig. 2.

Centralization Moves On

The trend in refinery engineering has been, and still is toward fully continuous units with small storage capacities between stages, but with greater and greater through-puts. Pneumatic controllers with various adjustable types of action, and control valves capable of equivalent response, have been developed over a period of years to meet the ever broadening demands of the process designers.

Many remote hand controls—forerunners of the modern M/P Indicating Control Station, were installed during the development years. These units, consisting of a manually operated instrument type air reducing valve mounted in a small panel with a pressure gage to indicate the output pressure, were used to directly position pneumatic control valves. If the controlled variable happened to be pressure, a second gage mounted on the panel indicated the condition in the controlled area.

Continuous processing demanded centralized control and central control rooms for efficient operation. This required the separation, sometimes by a considerable distance, of the instrument from the point of measurement. Pressure and differential pressure lines soon became so long as to be impractical, as did the capillary lines for pressure type thermometers. Over the years, therefore, pneumatic and electrical methods for transmitting measurement signals were developed and refined, and another change began.

The use of the various transmission systems allowed the control rooms to be completely removed from the operating area, with the added advantage that process fluids could be kept out of the control rooms, thus reducing fire hazards. And many process variables that heretofore could only be observed in situ were now measured and the measurements transmitted to various indicators and/or recorders in the control room.

Time Lag Problem

A disadvantage inherent in the use of centralized control panels with pneumatic transmission of measurement was the introduction of an appreciable time lag between the measuring element at the process and the indicator or recorder-controller on the panelboard. A similar lag existed in the return circuit to the valve.

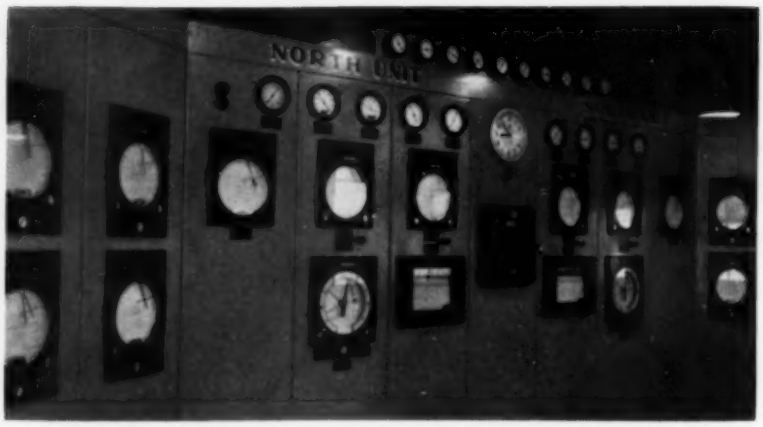


Fig. 5. Here is a control panel for two vacuum distillation units. Process is simple, products have high flash points, all control lines are short, and no pneumatic transmission lags are involved. A graphic panel would be neither economical nor desirable, yet many are installed on just such applications.

Another disadvantage was the excessive panel space required for the mounting of standard instruments. Control boards 100 ft long were not uncommon, and control rooms were large in proportion. It became increasingly difficult for an operator to gain an over-all picture of process operations from row upon row of similar appearing instruments on a long control board. Training of new operators became more difficult, and frequently additional manpower was required because of the "spread" of the panel.

The logical answer to the lag problem was the location of the controller at the process, closely coupled to the measuring and controlling elements. In order to maintain centralized control, however, an indication or record of the variable was needed on the board. This led to the development of "blind" pneumatic controllers operating on a 3 to 15 lb range, which were entirely separate from the indicating or recording instruments and connected into the system only by pneumatic tubing.

With a locally mounted controller and a board-mounted indicator or recorder, there were still the needs for adjustment of the set point and for manual operation from the control board in emergencies. The blind controllers, operating on a pneumatic-balance principle were readily adaptable to these needs. In this system the measured variable is translated into a pneumatic pressure by a transmitter; the set point is also determined by a pneumatic pressure. These two air pressures are pneumatically balanced against air pressure to the control valve. Thus, the transmitter and air-pressure regulator for the set point can readily be separated from the controller.

At this point our old friend the remote hand control (with two gages) returned to the picture, disguised as an M/P station. The two gages were now combined into one duplex gage. One point gave a continuous indication of the controlled variable, the other could be used to indicate the set point pressure to the controller or the pressure to the control valve. The station included manual to automatic transfer switches and a pressure regulator which during automatic operation was used to adjust the set point on the controller. For manual operation this regulator was used to position the control valve. This unit was small—occupying approximately 4½x5 in. of panel space.

The small size of the indicating station was a distinct advantage. It permitted a much needed reduction of control board and control room size. Control boards using these miniature instruments crowd-

ed together were not completely satisfactory however. With the new indicating stations, a single operator could see more instruments and observe the behavior of more of the process variables, but he had more information available than he could effectively correlate or use. Although the control boards were shorter, they were not the final answer.

Graphic Panels

Let us define a graphic panel. This term is generally used to describe a control panel which presents a simplified flow sheet of the process, with the major process vessels and equipment pieces represented by appropriately shaped symbols. The major process flows are represented by lines of various colors and widths. The various measuring and controlling instruments and alarm indications are placed in their proper positions in the flow diagram.

In another form, appropriate symbols are placed in the flow diagram, and similar symbols on the control stations, usually mounted below the diagram, and directly below the reference marker.

There has recently come to my notice another type which the designers refer to as "semi-graphic." It has recording control stations mounted below the diagram. "Deviation lights, which come on when any variable leaves the control point more than a pre-determined amount, are mounted in the flow diagram and at the corresponding control station. This particular panel also includes an industrial T. V. installation, whose receiver is somewhat too large to include in the flow diagram!

Primary Object

The primary object of the instrument system, of course, is to keep the operator informed about the process and the process equipment. The secondary object is to keep the operator informed about the functioning of the control equipment itself to accomplish these ends.

Early graphic panels used the indicating, panel-mounted station. If charts were required, these indicators had to be paralleled by conventional recorders, usually located below the graphic section or on a wing panel which flanked the central graphic section.

This duplication of indicators and recorders was eliminated by the introduction of the miniature recording station. This instrument performs all the functions of the M/P and makes a record of the controlled variable on a narrow strip chart. The recorder is approximately the same size as the indicator. It eliminates the need for separate recorders except for pyrometers which are still used for recording a number of temperatures.

There are those who question the wisdom of the change from standard to miniature recorders.

Temperature, liquid level, and pressure are process variables that are characterized by long time constants. They may use controllers mounted on the board.

When the process variable has a short time-constant, however, as in the case of flow, the transmission time-lag becomes all-important for optimum control.

Transmission time-lags are eliminated by having the complete control loop at the process, with the control supervised from the M/P Station on the graphic panel. With the controller mounted at the process, a pneumatic cut-off relay automatically seals the output of the controller away from the valve, when the operator desires to load the valve manually.

For proper control, the late designs of blind controllers provide all the accepted responses; proportional, rate, derivative, inverse derivative, or what have you, in practically any combination desired. The trend, however, is toward simplification.

Recent Designs

Other instruments now available for use on graphic panels include graphic type level indicators and various alarm units. These alarm units provide a visual indication of abnormal conditions by means of alarm lights which may be placed appropriately in the flow diagram. They may also provide an audible alarm if desired. They are operated by electrical contacts which may be actuated by almost any abnormal process to which it is desired to call the operator's attention immediately and forcibly.

The recent advances in pneumatic controller designs have been paralleled in the electrical types. All of the basic modes of control are available in the new improved designs employing the latest developments in electronic circuits. For example, vane type controllers are available which provide extremely close switching action. Vane-oscillator circuits are in use on millivoltmeters, potentiometers, thermometers, and pressure gauges. One instrument manufacturer is now marketing a line of electrical instruments which essentially duplicate all the functions of pneumatic instruments.

Electrical instruments reduce transmission lags to an insignificant value, and the influence of these instruments on graphic panels and on instrumentation in general is certain to be of considerable importance.

Since their introduction to the process industries, graphic panels have survived many variations and phases. One of the still unsettled arguments concerns the amount of detail which should be shown on the control panel. Some users indicate on the panel only those pieces of process equipment and those instruments which are necessary for the operation of the process. Others insist on supplying every minute detail. Obviously the graphic picture should not be crowded to the point of possible confusion. One rule which is sometimes applied is this—if the operator can get along without a particular symbol or instrument, then it should not be shown. It will be of no advantage and may actually be a hindrance when the operator is trying to locate the source of an upset. Fig. 3 is a panel on which detail has been added to the point of confusion. By way of contrast, Fig. 4 is a conventional panel on an identical unit.

The graphic panel is unquestionably here to stay. It satisfies a definite need, and like many other developments in the instrument field, offers many advantages when installed with reason and proper justification.

Shelf and console types have not been discussed, since they are, for the most part, variants in appearance rather than function.

— End —

Electrical Equipment Fundamentals

By A. T. LOHKAMP, Superintendent of Power Plant,
Pasco Packing Co., Dade City, Florida

Part 4—Three Phase Induction Motors

This is the fourth of a series of 7 "Q & A" articles presented to help plant men become more intimately acquainted with the electrical equipment in their charge. A thorough understanding of the points covered will improve operation and maintenance, and help employees advance to higher positions.

Installments of this Series Include:

Part 1—Operation and Maintenance	*Jan. '53*
Part 2—Distribution and Controls	*Feb. '53*
Part 3—Synchronous Motors	*Mar. '53*
Part 4—Three Phase Induction Motors	*This Issue*
Part 5—Single Phase Motors	*June '53*
Part 6—Technical and Design Data	*July '53*
Part 7—Selecting Generators and Motors	*Aug. '53*

Q—What is an induction motor?

A—An induction motor is one in which the magnetic field in the rotor is induced by currents flowing in the stator. The rotor has no electrical connections whatever to the line. This motor is by far the most commonly used of any of the motor types because it is the simplest in construction and has the broadest application.

The most common form of the induction motor is the **squirrel-cage** motor which takes its name from the fact that the rotor winding resembles the wheels of a squirrel cage.

Q—How is an induction motor constructed?

A—The conventional type of induction motor consists of a stator, which is in every way similar to the armature of a synchronous motor already described, and a squirrel-cage rotor with bearings to support it. The stator, because it receives the power from the line, is often called the "primary"; the rotor is often called the "secondary."

In the induction motor, the squirrel-cage winding takes the place of the field of the synchronous motor. This cage consists of copper bars mounted on a core and connected at the ends with heavy rings.

Q—How does an induction motor operate?

A—As in the synchronous motor, a revolving field is set up by the currents in the armature of the induction motor. As this field revolves, it cuts the squirrel-cage conductors and voltages are set up in them just as though the conductors were cutting the field. These voltages cause currents to flow in the squirrel-cage circuit; through the bars under the north poles, into the end ring, back through the bars under the adjacent south poles, into the other end ring and the circuit is completed back to the original bars under the north poles.

The current flowing in the squirrel-cage, down one group of bars and back in the adjacent group makes a loop which establishes magnetic fields in the rotor core with north and south poles. This loop consists of one turn, but there are several conductors in parallel and the currents are heavy. These poles in the rotor are attracted by the poles of the revolving field, set up the currents in the armature winding, and follow them around in a manner similar to that in which the field poles follow the armature poles in a synchronous motor.

Q—What do we mean by slip in an induction motor?

A—There is one very interesting and important difference between the synchronous motor and the induction motor; the rotor of the latter does not rotate as fast as the rotating field in the armature.

If the squirrel cage were to go

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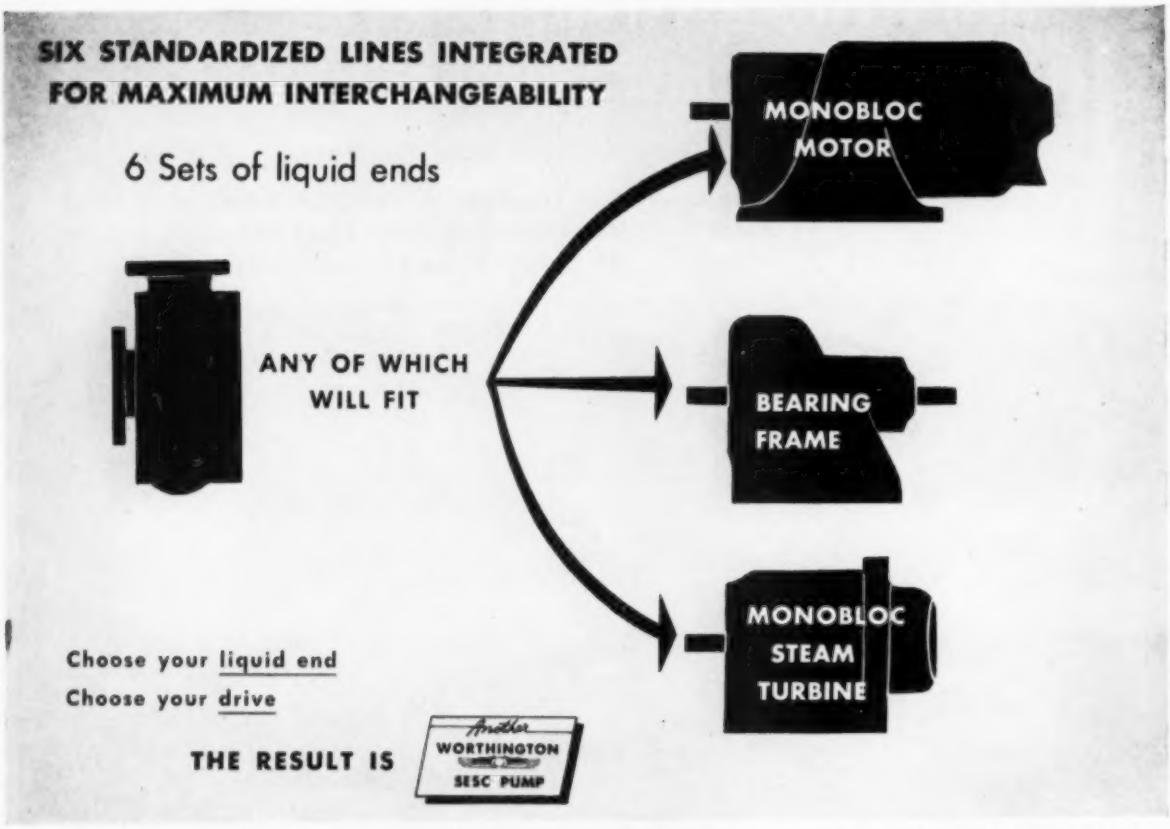

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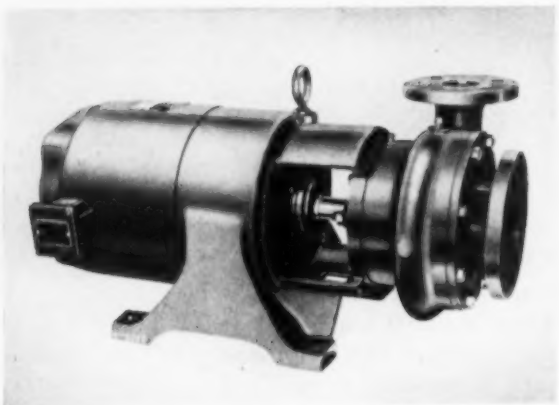

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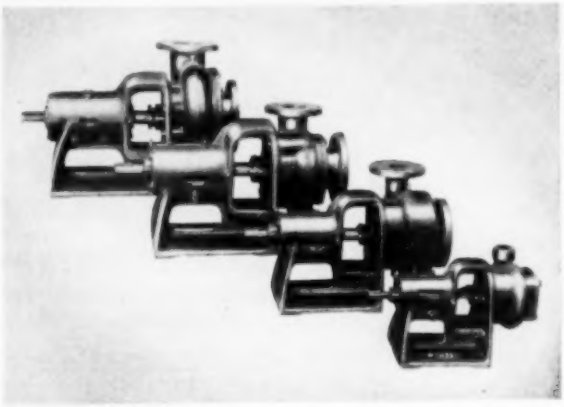

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Centrifugal Pumps

as fast as the rotating field, the conductors in it would be standing still with respect to the rotating field rather than cutting across it. Then there could be no voltage induced in the squirrel cage, no currents in it, no magnetic poles set up in the rotor, and no attraction between it and the rotating field in the stator. The rotor revolves just enough slower than the revolving field in the stator to allow the rotor conductors to cut the revolving magnetic field as it slips by, and thus induce the necessary currents in the rotor windings. Hence the motor can never go quite as fast as the revolving field, but is always slipping back, and this difference in speed is called the "slip." The greater the load, the greater the slip will be; that is, the slower the motor will run. But even at full load the slip is not very great; in fact, this motor is commonly considered to be a constant-speed motor.

Q—What are the important features of construction in a squirrel cage motor?

A—Since the squirrel cage induction motor is the general purpose motor, the first requisite is that its mechanical construction be sturdy and rigid so as to operate satisfactorily with minimum maintenance under the severe service conditions which are often encountered.

These motors are usually built with strong, sturdy frames having broad, well braced feet either cast integral or welded to the frame member. The stator or primary consists of a laminated sheet steel core with slots, in which are placed the carefully insulated coils. The coils are so grouped and connected as to form definite polar areas and produce a revolving magnetic field when connected to a polyphase circuit.

The rotor or secondary is also constructed of steel laminations but the windings consist of uninsulated conductors placed approximately parallel to the shaft and close to the rotor surface. These windings are short circuited or connected together at each end of the rotor by a solid ring.

The air gap between the rotor and stator must be very small to get the best efficiency and power factor. The shaft must, therefore, be very rigid and furnished with the highest grade bearings. By using ball bearings the uniformity of the air gap is practically assured for the life of the motor.

Q—What are the characteristics of the squirrel-cage induction motor?

A—The squirrel-cage induction motor is one of the most efficient motors built, being exceeded in this respect only by the synchronous motors in large sizes. The speed of the squirrel-cage motor is nearly constant under normal load and voltage conditions. It is dependent, as in the case of the synchronous motor, on the number of poles and frequency. As explained, the motor slows down just enough to produce the necessary torque. The difference in speed for any given load between the synchronous speed and the load speed is called the slip. The slip is usually expressed as a percentage of the synchronous speed. For instance, a motor rated at 1,800 rpm operates at 1,738 rpm when loaded, or 3½ per cent slip.

Slip is also a measure of the losses in the rotor windings; that is, in the above motor, 3½ per cent of the total power input is lost in heating of the rotor. Thus high slip adversely affects efficiency of the motor.

The power factor and efficiency of an induction motor is lower at light loads than at full load. Obviously, in selecting a motor for a definite load, the size should be such as to operate at nearly full load. Low speed motors have lower power factors than high speed motors. Therefore, the size and speed should be carefully considered in making the selection of a motor, to give the most satisfactory and economical arrangement with the driven machine.

The **starting torque** of the motor is the turning effort or torque which the motor exerts when full voltage is applied to the motor terminals at the instant of starting. The amount of starting torque which a given motor develops depends within certain limits on the resistance of the rotor winding. Starting torque is usually expressed as a per cent of full load torque. An increase of rotor resistance gives an increase in starting torque, with a corresponding increase in slip and a decrease in efficiency. In fact, all the desirable characteristics are so interrelated, that it is impossible to make one of them surpassingly good without adversely affecting the others. Motors can be built for high efficiency alone, or high starting torque or high power factor; but there is a commercial limit which prohibits a motor from being excellent in all of these characteristics.

Q—What is meant by normal starting torque?

A—In order to have a basis for normal starting torques, the electrical industry has established minimum values for motors from 2 poles to 16 poles inclusive.

With full rated voltage applied at the instant of starting, the starting torques will not be less than the following, expressed in percentages of full load torque.

2 pole—150%
4 pole—150%
6 pole—135%
8 pole—125%
10 pole—120%
12 pole—115%
14 pole—110%
16 pole—105%

Q—How are squirrel-cage motors classified as to their electrical characteristics?

A—Squirrel-cage induction motors have been divided into several major classes, according to the starting torques and starting currents.

With few exceptions, the different starting torques and starting current characteristics are obtained by the different designs of rotor slots and resistance of the rotor windings, the stator being basically the same for all types.

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A definition of the basic classes follows.

(1) Normal torque, normal starting current squirrel-cage motor.

A squirrel-cage induction motor with normal starting torque and low slip at the rated load. It has sufficiently high starting current to require, in many cases, a compensator or resistance starter for motors above 7½ hp.

(2) Normal torque, low starting current squirrel-cage motor.

A squirrel-cage induction motor which develops normal starting torque with relatively low starting current and which can be started at full voltage. The low starting current is obtained by the design of the motor to include inherently high reactance. The combined effect of induction and frequency upon the current is termed inductive reactance. The slip at rated load is relatively low.

(3) High torque low starting current squirrel-cage motor.

A squirrel-cage induction motor which develops relatively high starting torque at relatively low starting current and can be started at full voltage. The low starting current is obtained by design of motor to include inherently high reactance. The slip at rated load is relatively low.

(4) High slip squirrel-cage motor.

A squirrel-cage induction motor in which the starting current is limited by relatively high slip at rated load. Motors of this class used in elevator service are quiet in operation and have relatively low starting currents.

(5) Low starting torque, normal starting current squirrel-cage motor.

A squirrel-cage induction motor which has low starting torque and low slip at rated load. The efficiency of this type motor is usually higher than the first class. The starting current may be sufficiently high to require a compensator or resistance starter for motors above 7½ hp.

(6) Low starting torque, low starting current squirrel-cage motor.

A squirrel-cage induction motor which develops low starting torque with relatively low starting current and can be started at full voltage. The low starting current is obtained by design of the motor to include inherently high reactance. The slip at rated load is relatively low.

(7) Punch press motor.

A 5 to 8 or 8 to 13 per cent slip squirrel-cage induction motor which develops a high starting and accelerating torque with relatively low starting current with from 5 to 8 or 8 to 13 per cent slip at rated load.

Q—What are the usual methods for starting squirrel-cage motors?

A—Practically all squirrel-cage induction motors are designed to be thrown directly across-the-line at full voltage. For this purpose both manual and magnetically operated across-the-line starting switches are available. However, because of starting current limitations imposed by the power companies, where the same service feeds both power and light circuits, some means of reducing the starting current must be employed, depending upon design and type of motor. The most common method of reducing the starting current is to reduce the applied voltage by means of a reduced voltage starter.

There are two general types of reduced voltage starters: resistance and auto-transformer or compensator types.

The resistance type employs a heavy resistance in series with the line. The drop in voltage through this resistance produces a reduced voltage at the motor terminals. The starting current of the motor is reduced in direct proportion to the reduction of the voltage applied to the motor terminals.

The compensator starter usually employs two auto-transformers for the reduction of voltage to the motor terminals, and has the advantage of drawing less current from the line for a given reduction in voltage to the motor terminals.

If a resistance type starter is used to reduce the voltage to half value, the current drawn from the line will also be half the full voltage value. Whereas, with the auto-transformer type the current drawn from the line varies as the square of the voltage ratio of the transformer, so that if half voltage is applied to the motor terminals from the secondary of the auto-transformer, the current drawn from the line will only be one-fourth the full voltage value.

Q—What is a slip ring or wound rotor induction motor?

A—A slip ring or wound rotor induction motor differs from the squirrel-cage motor only in the rotor winding. The rotor winding consists of insulated coils, grouped to form definite polar areas having the same number of poles as the stator. The terminal connections of the rotor windings are brought out to slip rings. Leads from the brushes on the slip rings are brought out to an external resistance which can be regulated at will. The principle of operation is the same as that of the squirrel-cage motor. By inserting external resistance in the rotor circuit when starting, high torque can be developed with low values of starting current. As the motor accelerates up to speed the resistance is gradually cut out until at full speed the rotor windings are short circuited. The motor now operates with high efficiency and low slip.

Q—What are slip ring motors used for?

A—Slip ring motors are used where the excessive starting current of a large squirrel-cage motor would be objectionable and also for machinery which must start under full load, such as air compressors, displacement pumps, long lines of shafting, heavily loaded conveyors, and similar devices. They are especially desirable where the capacity of the motor is large with respect to the capacity of the generating plant, transformers, or lines from which the current is taken.

By inserting resistance in the rotor the motor speed can be decreased. This method of speed

(*Continued on page* 137)

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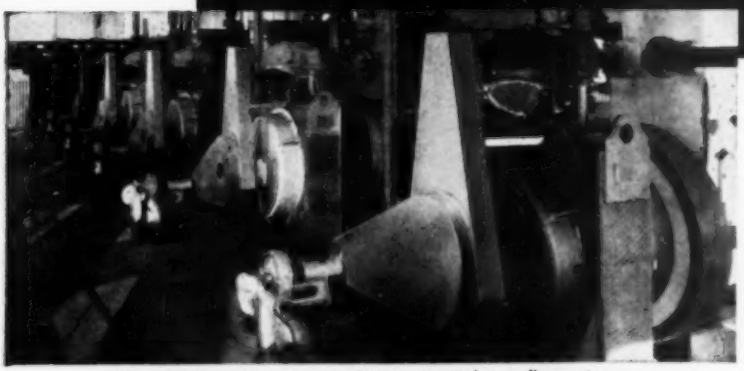
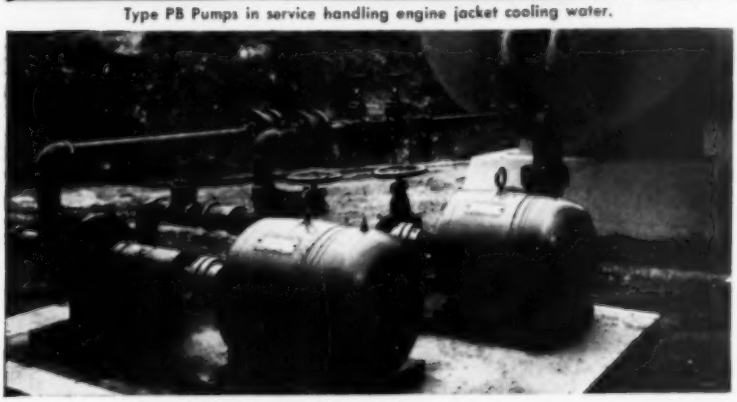
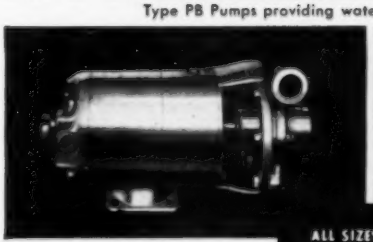
PEERLESS PUMPS



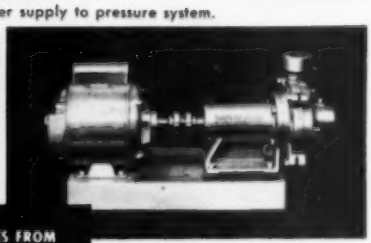
Type PB Pumps in service handling engine jacket cooling water.



Type PB Pumps providing water supply to pressure system.



Fractional HP Close Coupled Electric Type PE Fluidyne Pump



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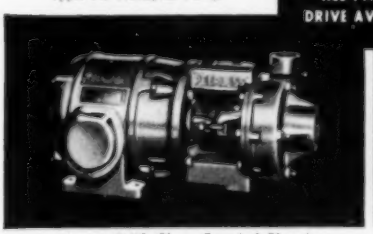
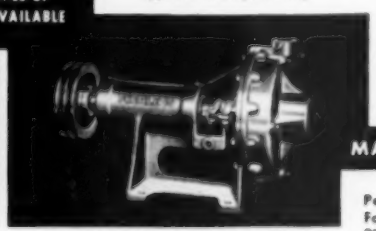


Integral HP Close Coupled Electric Type PE Fluidyne Pump



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Utilities . . manpower . . materials . . machinery can be expended uselessly — Check up NOW!

Suggested "Check List" for Your WASTE CONTROL Program

By **DAVID LONG, JR.,** Atlantic Steel Company, Atlanta, Georgia

THE broad term "waste" means that which is spoiled, injured, or rendered unfit for its intended use in manufacturing processes. It represents money, manpower, materials and machinery expended uselessly without any valuable return to your company.

Five Types of Waste

1. **Utility**—lights, water, heat, etc., when once expended, can never be recovered.

Control must be considered on the basis of prevention or elimination of wasteful practices.

2. **Manpower**—lost time and waste of talent.

Idle manpower can be easily recognized. Correct by better planning. Waste of talent implies misplaced manpower. Testing techniques and close personal contact by supervision will help.

3. **Materials and Equipment**—ineffective use and improper location of materials; operating equipment above and below capacity, misuse, lack of maintenance.

Develop "prevent waste" attitude among employees. Use full capabilities of equipment. Establish preventive maintenance techniques.

4. **Scrap**—unpreventable waste of materials and machinery due to the nature of the manufacturing operations.

This is not a complete loss in that it generally has some salvage value. Scrap losses can be reduced or even eliminated by making changes in methods, processes, materials and machinery.

5. **Rejected Products**—defective or below acceptable standards of quality and cannot be sold for full value.

Some of these can be reworked into quality products by additional processing and operations. Other rejected products that cannot be made into quality products, must be scrapped or sold as defective at a reduced price.

The following "check list" covers waste, possible sources, investigation and control. By the association of ideas, it will show you how to accomplish the most good for the best interests of your company.

WASTE CONTROL problems can usually be solved in several ways. This discussion is merely suggestive of a few of the possible directions for investigation by a responsible group, whether it be workers, supervisors, staff department or committee.

Utility Waste

Most of the waste of utilities will be obvious — unnecessary lights and fans, leaks in water, gas, steam, and air valves and piping, machinery left running when not in use, and heaters burning when not needed. Accomplish corrective action by developing a "prevent waste attitude" among workers and supervisors.

Another source not so easily recognized and far more difficult to correct is the waste loss through improper use of utilities:

a. Power loss through friction caused by improper lubrication of bearings.

b. Power loss through overloaded or antiquated distribution systems requiring major alterations.

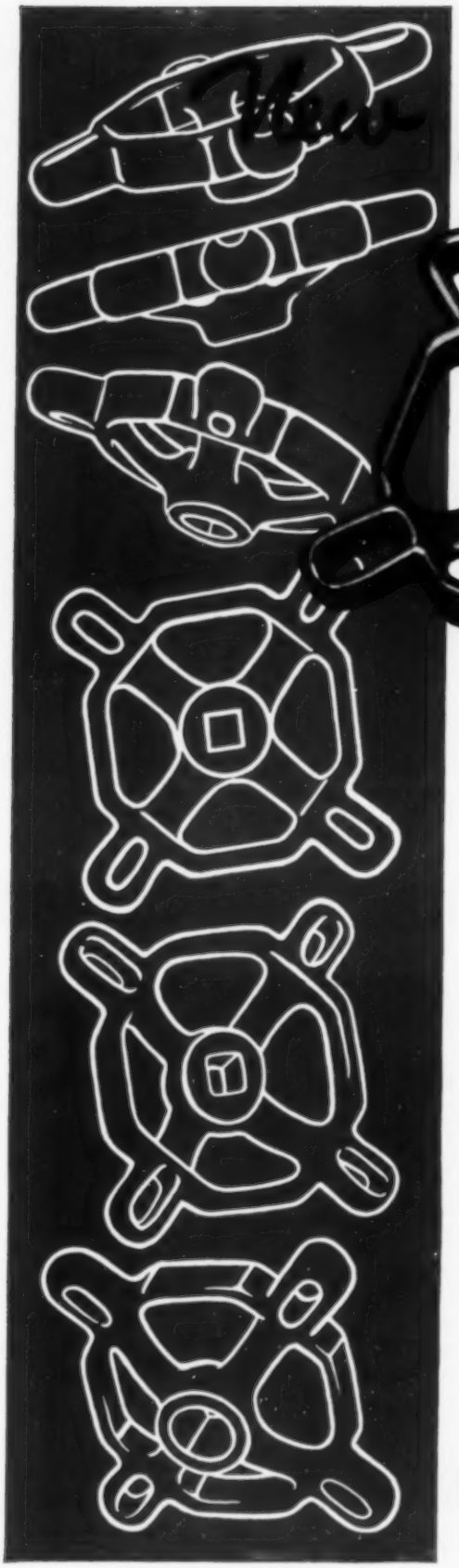
c. Fuel losses through poor combustion and improper operating practices in hand controlled heating equipment.

d. Excessive use of utilities over and above that required for satisfactory operation.

Manpower Waste

Lost time is an expensive waste that can never be recovered. Idle manpower and equipment can be easily recognized. Can be corrected by better planning.

But, particularly watch for the



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With this revolutionary new handwheel design, *ordinary hand pressure closes the valve absolutely tight, thus preventing leakage.*

Rounded lugs provide a firm, comfortable, secure grip, even when the operator's hand is wet or greasy. And the "Non-Slip" Handwheel stays cool —does not transmit excessive heat to the outer rim. Operator's hand cannot touch the top of the valve stem, which may be hot.

Only Lunkenheimer Valves have the new malleable iron "Non-Slip" Handwheel. Ask for a demonstration of its amazing performance. Hear how it will save you money by eliminating one of the most common causes of valve leakage.

WRITE FOR new bulletin describing the advanced "Non-Slip" Handwheel and demonstrating its outstanding features. The Lunkenheimer Company, Box 360EE, Cincinnati 14, Ohio.

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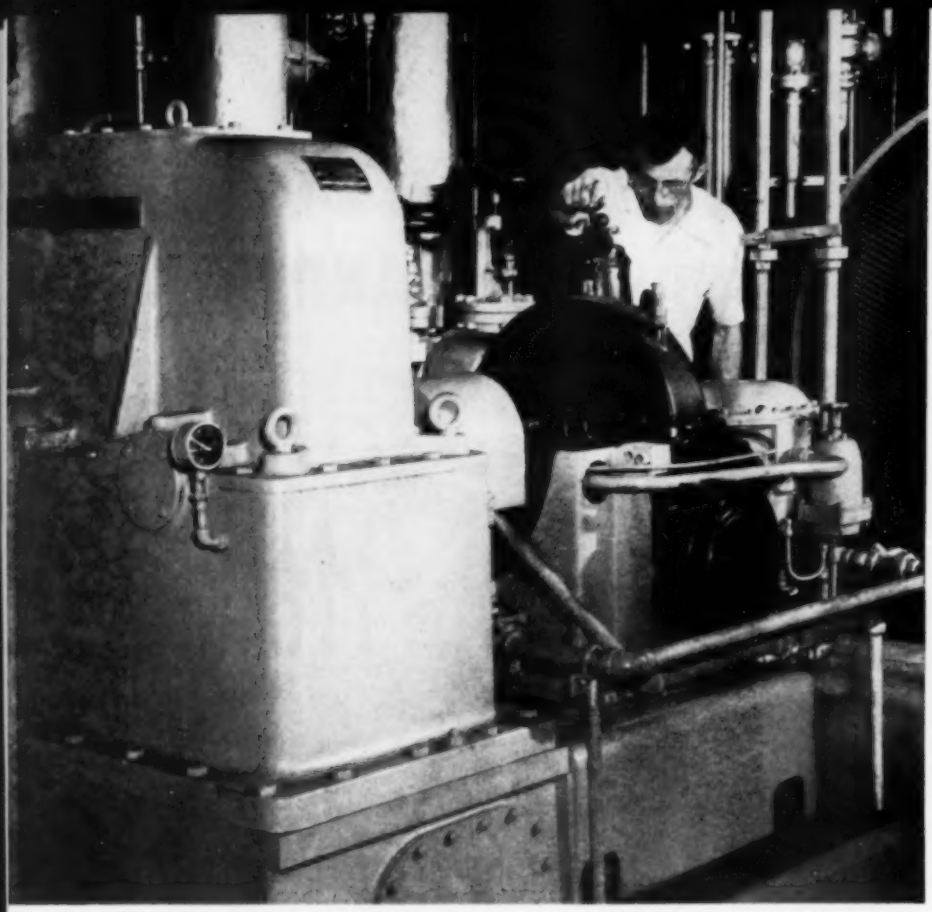
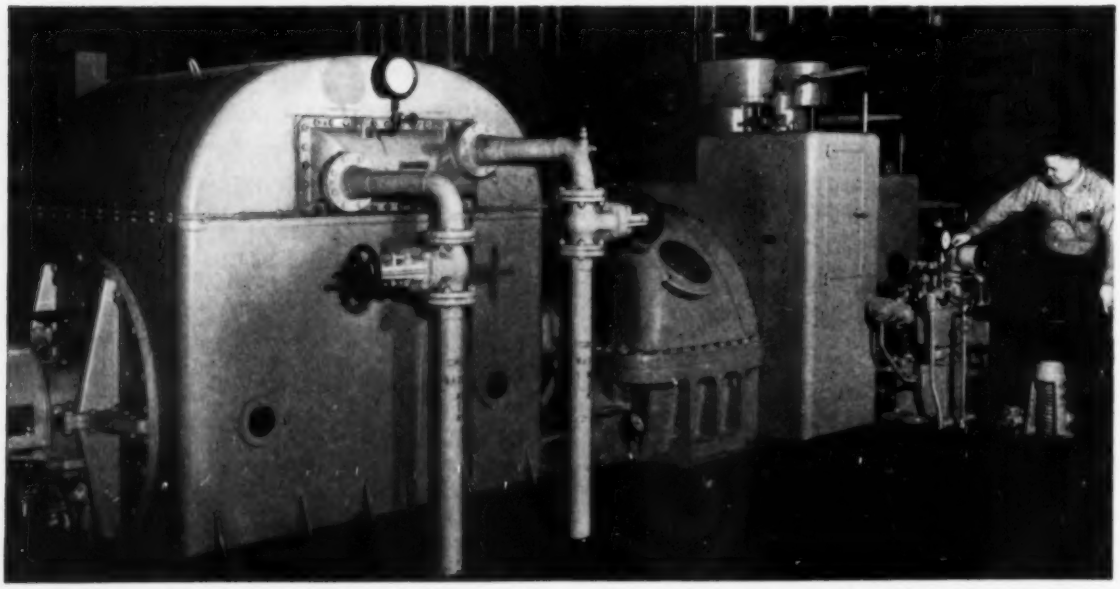
L-752-S

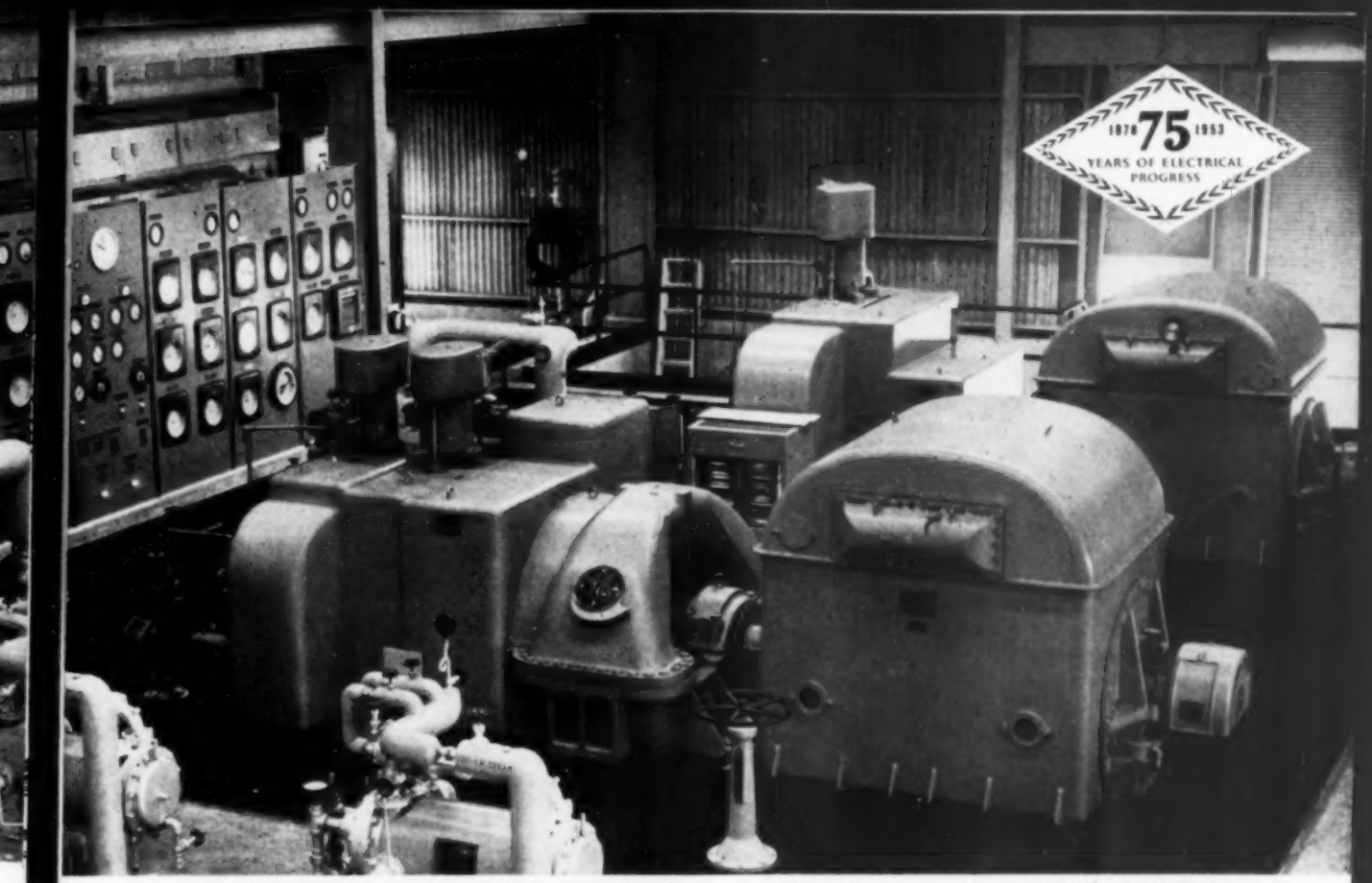


G-E TYPE DP MECHANICAL-DRIVE TURBINE, rated 135 hp, drives standby air compressors. J. A. Chamberlain, Supervisor of Utilities at Barber Refinery, checks turbine.

G-E Turbines Maintain Plant Steam



EASY STARTING of the General Electric 2000 KW double extraction turbine-generator at California's Refinery is demonstrated by W. E. Riley, Station Operator. Handwheel initiates small pilot valve, requires almost no muscle effort to operate.



DOUBLE-EXTRACTION CONDENSING TURBINE-GENERATOR in foreground supplies process steam at 150 psig and 15 psig for refinery operations at "California's" Barber, New Jersey plant. Other turbine is straight condensing.

Balance at "Calso's" Barber, N.J. Refinery

2000 KW Turbine-generators Reduce Boiler Steam to Process Pressures; Mechanical-drive Turbine with High-speed Precision Gear Drives Utility Air Compressor.

To make fullest use of available high-pressure steam, to obtain economical by-product power, and to automatically maintain plant steam balance over a wide range of steam flows, the California Refining Division of The California Oil Company selected two General Electric turbine-generators for its Number Two plant at the Barber, N. J. Refinery.

Extraction steam from one turbine-generator, a 2000 KW unit, is delivered at 150 psig and 15 psig for various process uses. Turbine governing accuracy is such that even when extraction steam or electrical load requirements vary, extraction pressures are held constant. A second 2000 KW unit exhausts to a condenser.

The "California" Refinery also installed a General Electric Type DP mechanical-drive turbine with a G-E high-speed precision gear to drive one of the compressors which furnishes utility air for use throughout the refinery. In an emergency, this turbine-driven compressor could meet complete compressed air demands.

If your plant uses process steam, why not take advantage of G.E.'s experienced turbine engineering resources. G-E engineers will study and recommend ways for you to best utilize steam supply. Get more for your turbine dollar with G-E turbine-generators. General Electric, Schenectady 5, N. Y.

1569

You can put your confidence in—

GENERAL ELECTRIC

loss of time and energy through laborious methods. Human nature is prone to expend more energy and time in accomplishing a result than is necessary. Check on methods improvement, accomplished individually by supervision and industrial engineers, or through a planned methods improvement program wherein all employees take part.

Waste of talent implies misplaced manpower from two respects:

1. Many employees have special qualifications which could be used advantageously by the company but which are not required on the occupation to which they are assigned. Testing techniques and close personal contact by supervision will help recognize such talent.

2. Sometimes higher paid employees are required to spend portions of their work time performing jobs that should be handled by lower paid employees. Any highly skilled employee who moves materials, gets tools or parts, etc., is wasting talent that could be better employed on the skilled portions of his work.

Materials—Equipment

1. Design — machinery and equipment built or purchased to perform a specific job should be capable of doing it. When the full capabilities of the equipment are not used, there is a waste of capital expenditure, power, space, and time. When equipment is required to perform jobs above capacity, breakdowns or rapid equipment deterioration is waste.

2. Improper use—Recklessness, overload, and other misuse by operating personnel results in waste through breakdowns, shortened life, and high maintenance costs. Tractors, lift trucks, rolling stock, overhead cranes, etc., are particularly susceptible to misuse.

3. Maintenance and repairs—Equipment life is shortened and breakdowns are most frequent without proper maintenance. Check on adequate preventive maintenance techniques.

4. Fire hazards—This is potentially the most wasteful of all destructive forces. Check continuously for existing fire hazards.

5. Waste of space—often overlooked as inconsequential. However, both storage and operating space are provided at considerable expense. Waste investigation should include layout of operating equipment and storage areas to make best possible use of available space.

6. Waste through ineffective use of lubricants, paints and brushes, office supplies, building materials, nuts, bolts, etc., can be corrected by developing the "prevent waste attitude" among all employees.

Have storerooms properly located and provide for efficient material movement to point of use. Safe and orderly storage will pay off. Check on possible "waste" in improper release or issue of materials and supplies.

Scrap Waste

Reduction or elimination of scrap must be accomplished through changes in methods, processes, or equipment. This is by far the most difficult phase of waste control to accomplish, yet possible results in savings far exceed that from all other phases combined.

Scrap salvage should be undertaken after exhausting all possibilities of eliminating the cause of scrap. Before any attempt to salvage, ascertain that the saving that can be expected will exceed the cost of salvaging operations.

Direct scrap salvage toward receiving the greatest possible value. Divert it into by-products, recover valuable portions by processing, by separating, or possibly return to the original condition of raw material.

Rejected Products

When all possibilities for eliminating the cause of rejection have been exhausted, investigate possibility of diverting rejected semi-finished products into products for which they are suitable. If they cannot be diverted, then consider salvage possibilities. As in scrap salvage, ascertain that the saving expected will exceed cost of salvaging operations and that the salvaging will make the best possible use of the material.

Of the five types of waste, the Rejects classification is likely to be most expensive because all elements of production expense are represented in cost of the item rejected. Consequently any slight reduction in the number of rejects represents appreciable savings. Efforts to control and reduce reject waste may be directed toward three channels:

a. Rejections can be reduced through use of quality control techniques.

b. Sub-quality in process production that has been rejected for its intended use can be diverted into other products.

c. Rejected products can be salvaged to give greatest possible value from the material.

Control Organization

Effective cooperation will be required from all parts of your company organization. Waste control is everybody's business. A waste prevention or salvage committee will furnish the leadership, stimulation, etc., necessary to "spark plug" the program.

Make sure the work of your various committees is publicized to stimulate interest and a "prevent waste" attitude among all employees.

Use displays—show the effect of waste on your company and particularly how it can affect job security. Show the effect of poor quality on customers, company, and individual jobs. Posters will do an effective job. When the program has developed, employee par-

(Continued on page 136)

EDITOR'S COMMENTS

This "check list" has been adapted from data furnished by **David Long**, Director of Personnel Administration and formerly Chief Industrial Engineer, **Atlantic Steel Company**, Atlanta, Georgia.

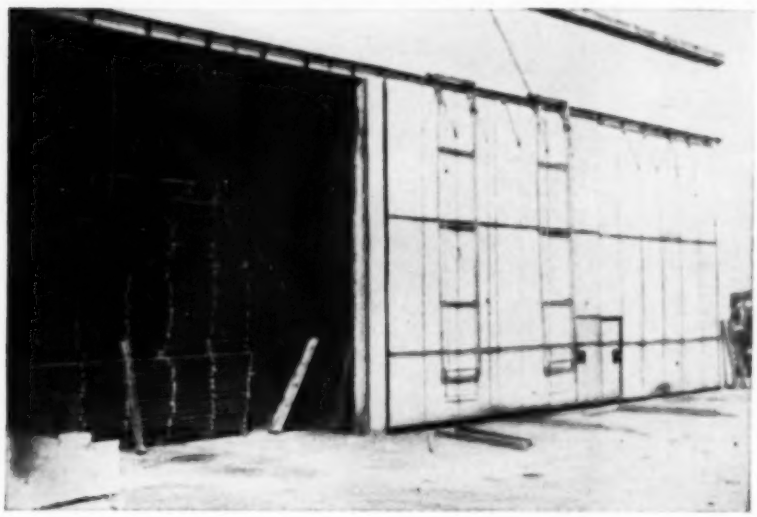
His comments are presented with the idea of pointing out possible directions of investigation and of stimulating thought toward planning the overall objectives to accomplish the most good for the best interests of your company.

Many of these waste control techniques have been successfully "plant tested" in Atlantic Steel Company's operations in Atlanta, Georgia. From its beginning in 1901 with one mill producing only cotton ties and barrel hoops, the plant now covers almost 200 acres, makes 65 different products, and provides jobs for over 2,000 employees.

Atlantic Steel is the home of Dixisteel products. Supplementing three open hearth furnaces, with an annual rated capacity of 188,000 tons, an electric furnace placed in operation in early 1952, increased the company's total steel output to 300,000 tons annually.

"Best" New Dry Kilns Work Better with Armstrong Unit Trapping

4 Traps Increase Capacity 8%



▲ One Armstrong No. 215 inverted bucket steam trap is used on each of the four dry kiln coils at Wells-Oates Lumber Co., New Bern, N. C.

◀ The time cycle on this lumber dry kiln was reduced from 72 to 66 hours by Armstrong Unit Trapping.

OFTEN a large capital investment in steam heated equipment is not utilized fully simply through failure to drain condensate and air efficiently. Here is a typical case:

Wells-Oates Lumber Co., New Bern, N. C., recently made one of the finest and most modern dry kiln installations possible. And it worked fine. But, it works better now, thanks to the installation of an individual Armstrong steam trap on each of the four steam coils in the kiln. The kiln cycle time has been reduced from 72 hours to 66 hours. The capacity has thereby been increased over 8% by an investment in traps of only a little over $200.

The trap installation was made upon the recommendation of DeWitt H. Skinner of Allan T. Shepherd Co., the local Armstrong Representative. The reason behind his recommendation made sense to the Wells-Oates people —*"with one trap on each of the four coils of the kiln, all coils would be properly purged of condensate and air and it would, therefore be impossible for one coil to influence the operation of another coil." The results proved the point.*

Your local Armstrong Representative may be able to show you how to get more out of your steam heated equipment. Remember, he sells a product that is *guaranted to satisfy. Call him or write:*

You always get more out of equipment when you use Armstrong "Unit Trapping"

ARMSTRONG MACHINE WORKS

806 Maple Street, • Three Rivers, Michigan

See Our Exhibit
National Power Show
Grand Central Palace, New York, December 1-6

SEND FOR 44-PAGE STEAM TRAP BOOK
a Catalog and Educational Handbook on Condensate Drainage

Attach to your Company Letterhead and Mail Today.

ARMSTRONG MACHINE WORKS
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Please send me a Steam Trap Book.

Name .....

Title .....

The safety valves of your electrical system

Maintenance Tips for CIRCUIT FUSES

THOMAS TRAIL *comments on procedures for the plant electrician*

CIRCUIT FUSES are seldom noticed until they interrupt a circuit. Yet, like steam safety valves, they should be checked and examined periodically. Failure to do so may result in unnecessary and costly circuit outages or even more costly motor and control damage caused by overfusing.

The plant electrician should establish a definite program of fuse maintenance including periodic checkups to discover fuse substitutions or shunting, poor fuse contact, fuse overheating and fuse damage. Such conditions should be corrected immediately.

Circuit outages? Your maintenance program should include periodic checkups to discover fuse substitutions or shunting, poor fuse contact, fuse overheating and fuse damage.

Fuse Capacity

Wherever possible, information pertaining to correct fuse capacities and types required should be placed in or on enclosing cabinets and other locations adjacent to the fuses. This will serve as a fuse replacement guide and help prevent fusing errors. If not provided at fusing locations, it should be made available to the electrical maintenance crews.

In fusing feeders and branch circuits, the fuse capacity must not exceed the allowable current-carrying capacity of the conductors. If the latter does not correspond to the rating for a standard size fuse, the next larger rating of fuse may be used, provided that it does not exceed 150 per cent of the allowable current-carrying capacity of the conductor.

Where a feeder supplies a motor load only, the fuse rating must not exceed the rating of the branch-circuit fuses protecting the largest motor of the group, plus the sum of the full-load currents of all the other motors of the group.

Where two or more motors of equal horsepower are the largest in the group, one should be considered the largest in calculating the feeder fuse rating.

If two or more motors of the group must be started at the same time, larger feeder conductors and hence correspondingly larger ratings of fuses may be required.

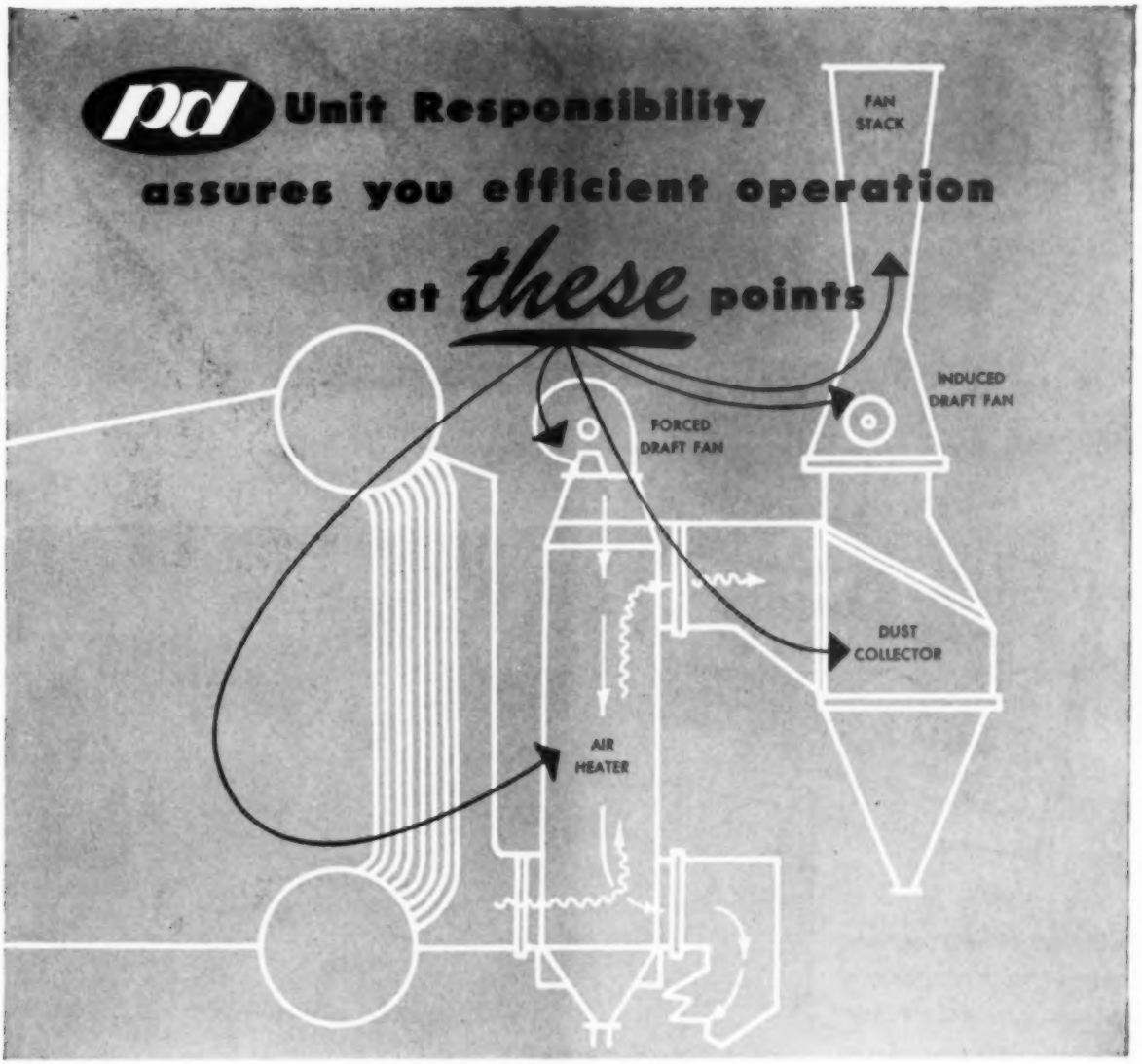
If a feeder supplies a motor load plus a lighting or a lighting and appliance load, the fuses protecting the feeder may be rated sufficient to carry the lighting or lighting and appliance load plus the starting current of the motor, but not to exceed 400 per cent of full-load motor current. Where two or more motors are supplied by the feeder, the motor load must include the starting load of the largest motor of the group plus the sum of the full-load currents of all other motors of the group.

Where branch circuits supply only motor loads, the fuses should be capable of carrying the starting current of the motor, but must not exceed 400 per cent of the motor full-load current.

Two or more motors, each not exceeding one horsepower in size, nor six amperes full-load rated current, may be connected to a branch circuit protected by fuses rated at not more than 20 amperes at 125 volts or less, or 15 amperes at 600 volts or less.

Two or more motors of any size, each provided with individual running overcurrent protection, and controller approved for group installation, may be connected to one branch circuit, provided that the branch circuit fuses have a rating sufficient to carry the starting current of the largest motor of the group plus an amount equal to the sum of the full-load current ratings of all other motors of the group. However, the branch circuit fuse must not be larger than four times the full-load current rating of the smallest motor of the group, unless the thermal cutout of the motor is approved for group installation and marked to indicate the maximum size fuse required for its protection.

Where motors operate under normal load conditions and are individually fused, lag type or delayed action fuses may be profitably employed for their protection. The fuse rating can be equal to the



Unit Responsibility, for important components of plant design by the Prat-Daniel Corporation, relieves your engineers of necessary problems of coordination that often arise when equipment is purchased from several sources.

Prat-Daniel, designing and manufacturing engineers of *Forced Draft Fans*, *Air Preheaters*, *Tubular Dust Collectors*, *Induced Draft Fans* and *Fan Stacks*, make possible this coordination of components by a single company with over a quarter of a century experience in the power field.

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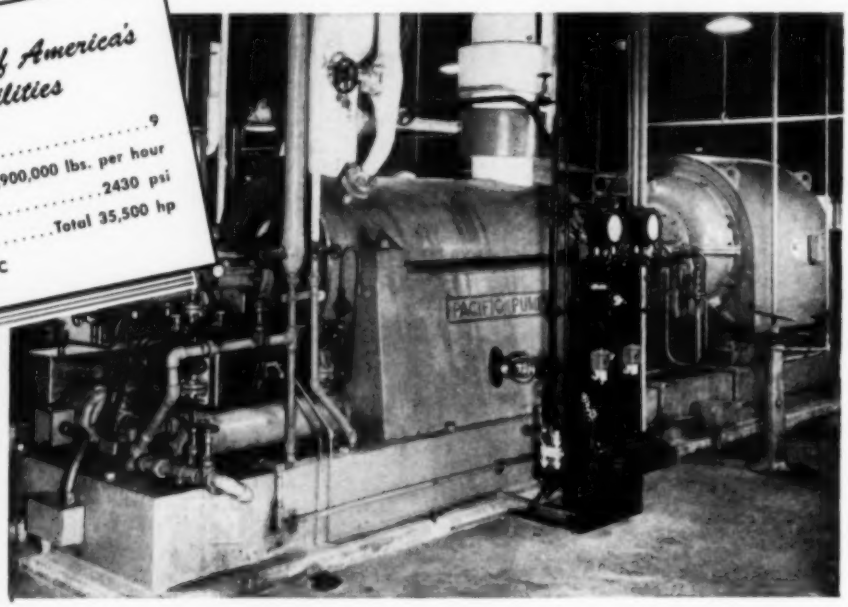
NUMBER OF PUMPS.....9
CAPACITY.....Total 7,900,000 lbs. per hour
DISCHARGE PRESSURES.....2430 psi
ELECTRIC MOTOR DRIVE.....Total 35,500 hp
CUSTOM-BUILT BY PACIFIC



Pacific Boiler Feed Pumps are fabricated from selected materials to provide the utmost structural strength and stability – maximum resistance to corrosion-erosion and wear. Built in multi-stages for capacities to 2700 gpm; discharge pressures to 3000 psig; speeds to 5000 rpm.

Pacific SINGLE STAGE UNITIZED STEAM TURBO PUMPS

less unit cost–
less floor space–
steady dependable output!

Capacities to 500 gpm
Discharge Pressures to 1100 psi
Steam to 900 psi–850°F. TT
Exhaust Pressures to 50 psi
Speeds to 10,000 rpm

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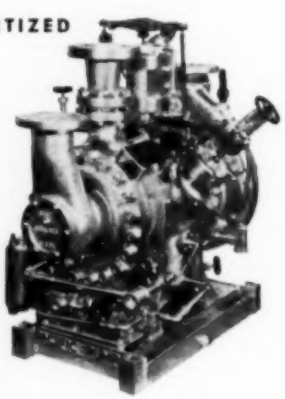

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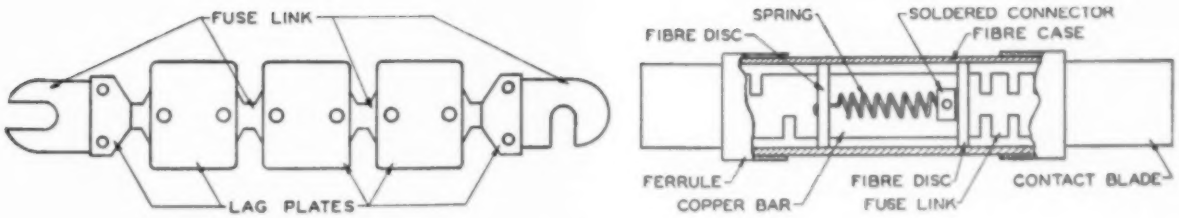
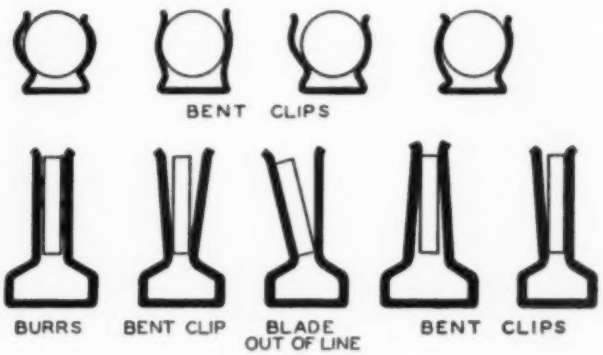


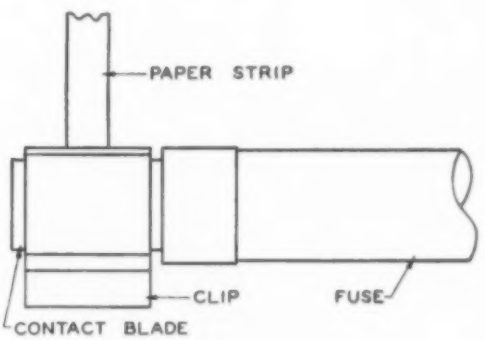
Two types of delayed action fuses—lag plate unit type and two element type.

This link is provided with "lag plates" that absorb heat and slow the melting of the link. This prevents melting of the link during the short period of motor starting. But since the "lag plates" do not increase the carrying capacity of the link, an extended overload or short circuit will melt the link and open the circuit before harm occurs.

In another type (not illustrated), time lag is achieved by placing the link inside a fiber cylinder that is packed with powder. The cylinder fits inside the fuse case. The powder serves to absorb heat and thus delay melting of the link, as well as to extinguish the arc when the link melts.

In the type illustrated above, the fuse contains two elements in series—a copper fuse link that opens on overloads above 500 per cent of the fuse rating (such as short-circuits), and a thermal cutout. The coil and metal require considerable time to heat sufficiently to melt the soldered connection and permit the spring to open the circuit, thus providing an unusually long time lag.





Make sure that the fuse holder clips provide adequate pressure over their entire contacting area. Here are a few examples of fuse clips that do not provide the adequate contact pressure. Remember that even though the clips are true in shape, it is possible that they do not provide sufficient pressure, may be oxidized, or have lost their temper due to overheating.

This test will disclose insufficient pressure. If a thin strip of paper can be inserted between the clips and the blade or ferrule of the fuse, even for a short distance, insufficient pressure is indicated. If evident, a new clip should be installed or a clip clamp used to provide the needed pressure. If oxidation is evident, clean contact surfaces of the clip with emery cloth.

running current rating of the motor, and must not be greater than 115 per cent for enclosed motors or 125 per cent for open type motors, unless such a rating does not correspond to a standard rating of this type of fuse. In this case the next larger standard rating may be used, provided it does not exceed 140 per cent of the motor rating.

This insures much greater overload and short-circuit protection for the motor than does the use of ordinary fuses since a much lower rating of fuse can be used. Where each motor is supplied from an individually fused branch circuit, the one set of fuses can be employed to protect both the motor and the conductors.

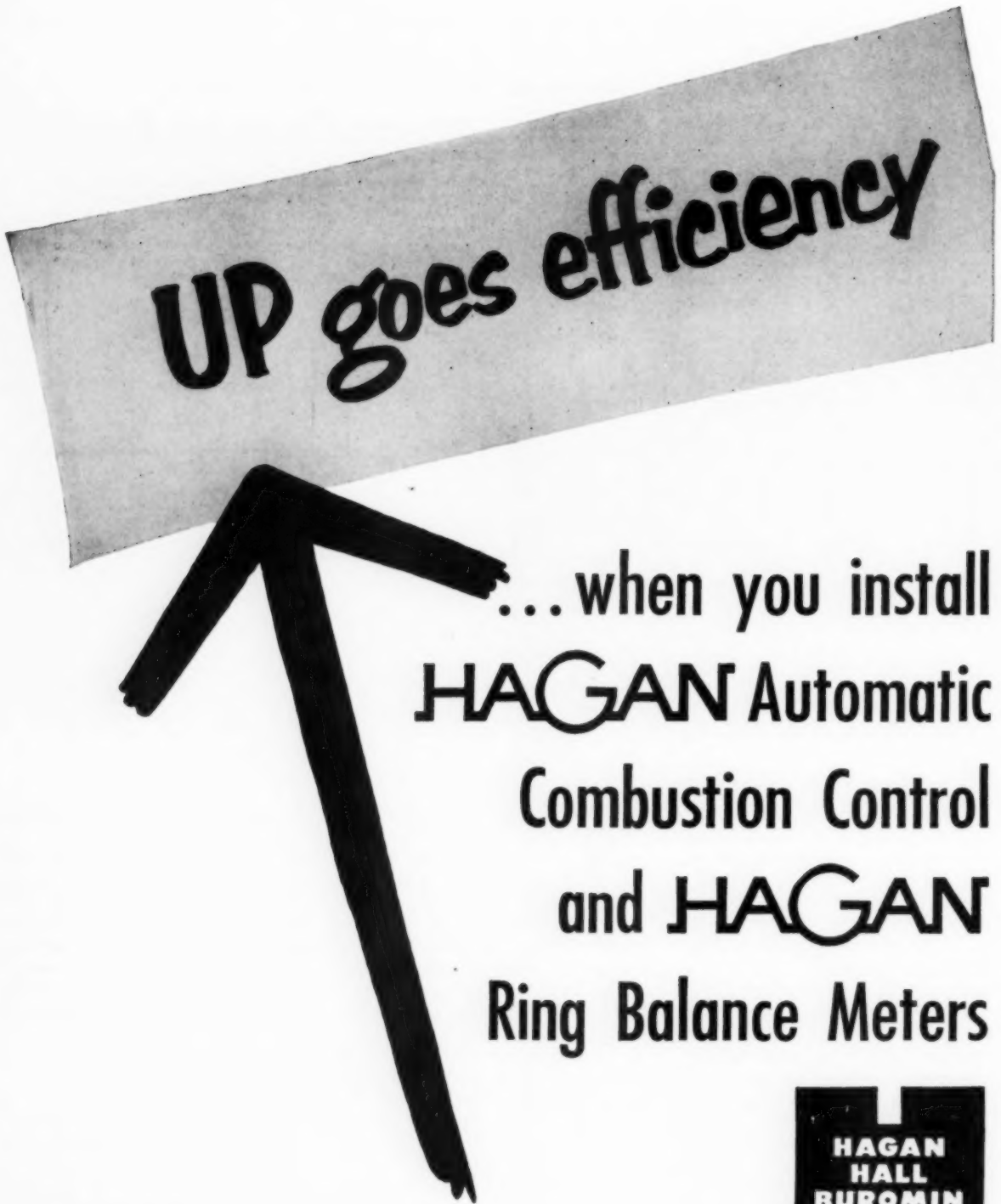
For circuits supplying transformer type arc welders, the fuses protecting the conductors must not be larger than 200 per cent of the conductor current-carrying capacity. Each welder must be fused at not more than 200 per cent of the rated primary current of the welder. These fuses may be at the welder or protecting the welder supply circuit.

The same conditions apply to the fusing of resistance type welders and their supply circuits, except that the fuse ratings in each case must not exceed 300 per cent of the conductor current-carrying capacity or the rated primary current of the welder respectively.

Where induction and dielectric heat generating equipment is used, the fuses protecting the equipment other than motor-generator equipment must not be rated at more than 200 per cent of the nameplate current rating.

On circuits supplying other than motor loads, ordinary renewable and non-renewable fuses are usually suitable. But where circuits supply only motor loads, lag type or delayed action fuses are preferable, since they will not open under the starting current of the motor yet will furnish greater overload and short-circuit protection. Two types are illustrated.

The second type of delayed action fuse illustrated (two element) is also made in plug types and in this form is especially useful on low amperage circuits supplying small motor and portable tool loads. One style is equipped with the conventional Edison base like ordinary plug fuses. Another style is pro-



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When you install Hagan Automatic Combustion Controls and Hagan Ring Balance Flow Meters, you are certain of accurate and dependable results, low maintenance costs, increased efficiency and economy of operation.

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For combustion control and metering systems which are versatile, accurate, and durable, install HAGAN. Our engineers will be glad to show you what HAGAN Combustion Controls and HAGAN Ring Balance Meters can do.

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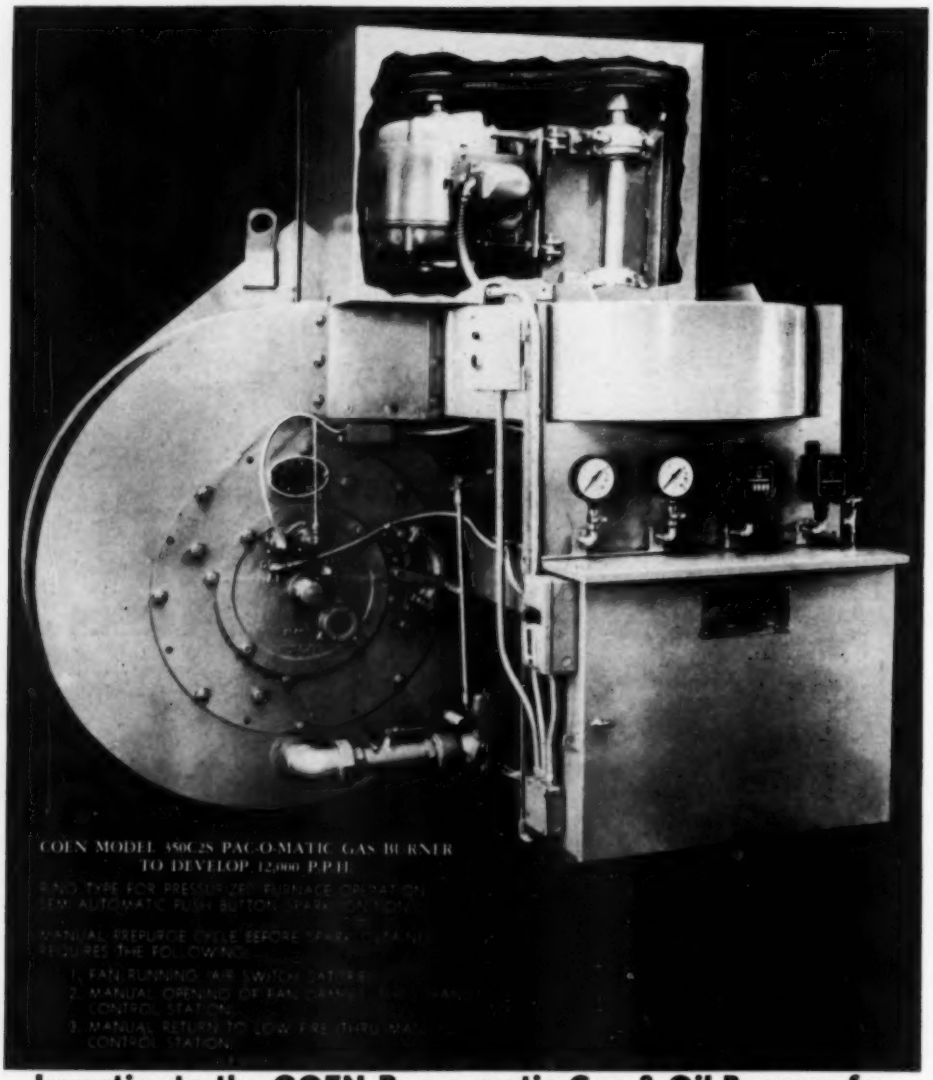

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NORTHWEST—Service Engineering Co.
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WESTERN CANADA—Peacock Bros., Ltd.
2132 Burrard St., Vancouver, B. C.

vided with special threads, and is so designed that it will fit only the type of fuse holder that matches its amperage rating, thus preventing overfusing of the circuit.

It is practically impossible to bridge out this type of fuse with wire, coins, metal, tinfoil, etc. This is especially of value where portable tools and lights are used, since portable cord short-circuits can produce a current flow of from 300 to 800 amperes, equivalent to the arc of an electric welder. Adapters are available to permit these fuses to be used in ordinary Edison fuse holders. But the adapter is so designed that once installed it cannot be removed without destroying it, hence its use insures against circuit overfusing.

Locating the Fault

When a fuse blows it usually indicates the existence of a fault on the circuit, in the equipment supplied by the circuit, or in the fuse or fuse holder. It is therefore important that the fault be located and corrected before installing another fuse since it, too, is likely to blow and cause another service interruption.

Possible causes of fuse blowing include short-circuit or ground on the circuit or in the equipment supplied; overload; fuse time lag insufficient to carry motor starting current; overheating of the fuse (poor electrical contact in the fuse or fuse holder); use of too small a capacity fuse; overheating of the fuse (sometimes happens when a number of fuses are installed in an enclosure); and failure of the fuse link. Latter can be caused by loosening of the link terminals under excessive vibration.

Overheating

Often fuses that blow due to overheating will give a visible indication—charring of one end of the fibre cartridge fuse case; charring of one end of the fibre support bar in a renewable cartridge fuse; burned or partially melted end, washer or ring or link end or link clamping washer or bolt in a renewable cartridge fuse; discoloration of one of the fuse contact blades or ferrules (poor contact permitting air to reach the metal

(*Continued on page* 136)

"If it's metal . . . I'll cut it"

A two-hand, portable, on-the-job tool to cut round stock — bolts or rods. Multiplies applied power 80 times — 50 pounds on the handles means approximately 4000 pounds at cutting edge — and cuts easily in one movement and one second of time.

Saves *labor*, saves *time*, saves *money* — in shop or on the job. Sizes to cut from ¼" up to ¾" annealed bolts in thread.

Other models to cut flat stock, bars, wire, stranded wire rope, straps, chain, cable, etc. Made in fine tool quality to stand up in long hard usage. Every Porter Cutter you can use in your plant on repairs, dismantling, servicing or maintenance saves you money — get acquainted with the Porter Cutter line — write for catalog and consult your Industrial Supply House.

50 pounds pressure on the handles delivers approximately 4000 pounds at cutting edge.

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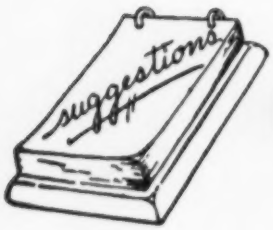


HELPING the *MAN-IN-THE-PLANT*

ideas . . . tools . . . methods . . . devices

Industrial Battery Repairs

Instructions and precautions briefed on how your shop can use a carbon arc burner.

LEAD BURNING is becoming increasingly important in battery maintenance programs as industrial plants become alert to the economic advantage of more careful treatment of the energy sources which drive so many lift trucks, tractors, shuttle-cars and other industrial vehicles.

Lead burning (welding) may be done with an acetylene and oxygen torch or with a carbon burning outfit. The latter uses electrical power from the battery being repaired and involves but the simplest of equipment. These instructions and precautions are offered by Gould-National Batteries as part of its current plus-performance plan.

Equipment

The carbon burner consists only for an electrode holder and a carbon rod. It is designed for six volts (three cells of a battery) as its power supply. It is a common error to use the carbon burner on either fewer or more cells, the former being inadequate for making a good weld, the latter actually endangering battery, operator and joint.

The burning tool may be connected either directly to the battery being worked upon or to three cells of an adjacent battery (if the unit under repair is entirely discharged.)

The rod is pointed to a ⅛ in. tip and is permitted to extend from the holder to a length of about 1½ in. When possible, it should be connected to its power source so that the carbon rod is of negative polarity. This makes welding easier as it tends to keep the joint and the working surface clean. The lead surfaces to be welded must be clean. A wire brush may be used for this purpose after the surfaces have been neutralized. The inside hole of a connector may be cleaned with a knife. The tip of the carbon should be wire-brushed before starting. Dark glasses are recommended.

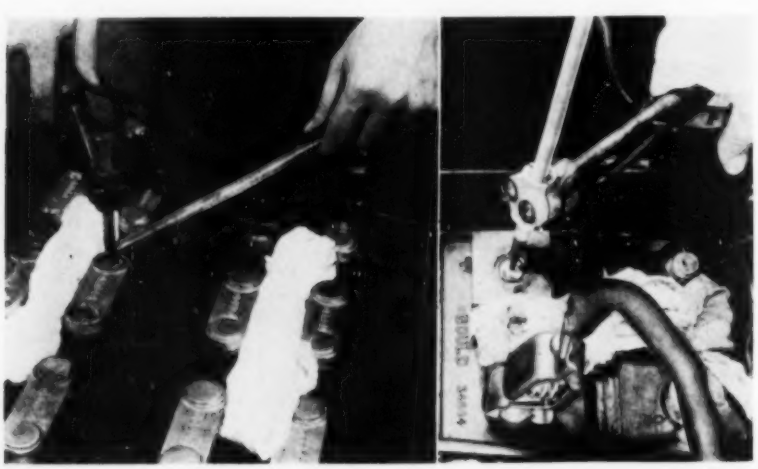
Process Data

The secret of making a good joint is to have clean materials and a hot carbon. The technique calls for thoroughly heating the center of the part being worked until a puddle of molten metal exists. Only then may additional lead be added. Work rapidly to complete the operation before the entire part melts. When possible use a damp rag to surround the part being worked on. When building up posts or splicing a connector, use molds made for the purpose.

After making a burn, allow the joint to cool undisturbed. In cooling the lead will shrink slightly. Do not move or disturb the joint during cooling; this may cause the lead to crystallize and result in a poor joint.

When working within a mold, it is necessary that the carbon not be permitted to touch the side of the mold.

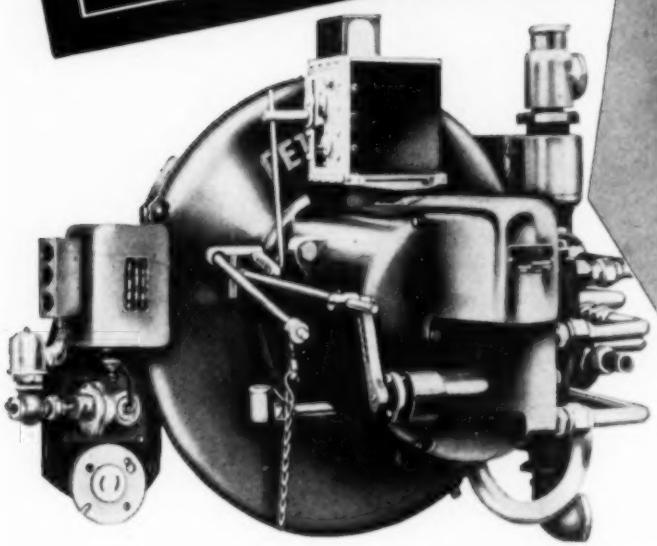
To determine whether a weld has been properly made it is wise to test with a pair of pliers (after the joint has cooled) to see if the joint will strongly resist separation. If separation occurs, examine the two surfaces to determine the points and nature of weakness so that the



Proper technique in lead burning for battery repair involves using three cells of the battery (six volts) and a simple pointed carbon rod. At the left, a connector is being burned to a post—fresh lead being applied to the rod so that it flows down into the puddle, and damp rags being used to protect adjacent parts.

When building up battery posts (right), the use of a mold is helpful, but care must be taken to prevent the carbon rod from touching the side of the mold.

Are steam costs YOUR responsibility?



MODERNIZE WITH A Petro INDUSTRIAL OIL BURNER

and cut steam costs!

HERE'S WHAT PETRO WILL DO FOR YOU:

LOW FIRST COST

Petro industrial oil burners are designed and built to *modernize* the firing of your present boilers. This means that you save substantially on initial installation costs—yet enjoy the efficiency, the dependability, and the complete automatic operation that has been traditional with Petro burners for over 50 years.

LOWER FUEL COSTS

A Petro oil burner's economy is unchallenged. You save two ways. First, you save on fuel cost, because heavy oils cost less per gallon and have higher heat value. And second, a Petro burner is designed to burn these low-cost, heat-rich heavy oils with complete dependability. Whether the oil is thick or thin a Petro feeds it steadily under precise automatic control. You get more efficient firing.

UNUSUAL FLEXIBILITY

Here is another Petro value. Under automatic modulating flame control it is extremely flexible in following fluctuating steam demands. If yours is a problem of "high and low" steam requirements—than a Petro burner is your answer. It follows the load without hesitation, and throttles down to a steady low burning rate if desired.

LOWER OPERATING COSTS

Petro Industrial Oil Burners are completely automatic. They require a minimum of supervision. Boiler rooms stay clean. The simple, sturdy design of the Petro burner and its easy accessibility reduce upkeep to a minimum—save you money year after year.

Leading heating contractors everywhere recommend and install Petro oil burners. See your contractor, or mail coupon below.

INDUSTRIAL, COMMERCIAL, RESIDENTIAL—An oil burner for every firing need

PETRO

50 Years of Leadership in Automatic Heating and Power Equipment

PETRO, 3217 W. 106th St., Cleveland, Ohio

Please send me the Petro catalog of commercial-industrial oil and gas-oil firing equipment.

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Cut wire fence re-coating costs!

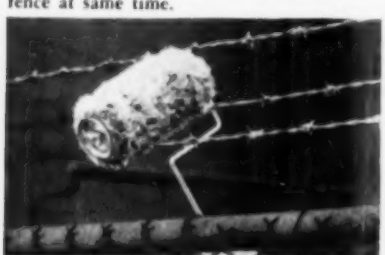
Users Report Savings of 30% to 40% With Rust-Oleum Extra-Long Nap Lamb's Wool Roller!

Special roller glides easily over wire sections. 99% of the material is used on the fence—*not* on the workers, *not* on the ground.

A new, exclusive, different-type roller! Greater diameter, specially-selected skins, and Extra-Long Nap Lamb's Wool give more coverage . . . *faster!*

Extra-Long Nap Wool plus Rust-Oleum's *exclusive* penetrating qualities work in to coat approximately 70% of other side of fence at same time.

Man follows with "dry" roller on opposite side of fence to catch and use surplus and quickly coat remaining 30% of the wire sections.



Even barbed wire sections can be roller-coated in one easy pass with special Rust-Oleum Roller.

On longer fences, brush men, as part of fast moving "team", follow roller men to brush pipe framework and arms.

STOP with RUST!

RUST-OLEUM

ATTACH TO YOUR LETTERHEAD—MAIL TODAY!

RUST-OLEUM CORPORATION
2725 Oakton Street, Evanston, Illinois

Please show us how your new Extra-Long Nap Lamb's Wool Roller will cut our wire fence re-coating costs. Include prices, complete Rust-Oleum literature and nearest source of supply. We have approximately_____yards of wire fencing.

situation can be corrected on the second try.

When adding new lead to a joint, touch the new lead to the carbon rod and let it flow down into the puddle rather than to plunge cold lead into the puddle itself.

In burning a connector to a post, one slow trip around the post should be sufficient to make a satisfactory weld. Although the same is true of burning a post to the lead-insert of a new cover, the depth of the joint is such that considerable lead will have been removed from the post in the single slow circuit around the joint. Therefore, the carbon point should be returned to the center of the post and new lead added to raise the post height up to the level of the top of the post mold.

Better Packaging Increases Output and Cuts Cost

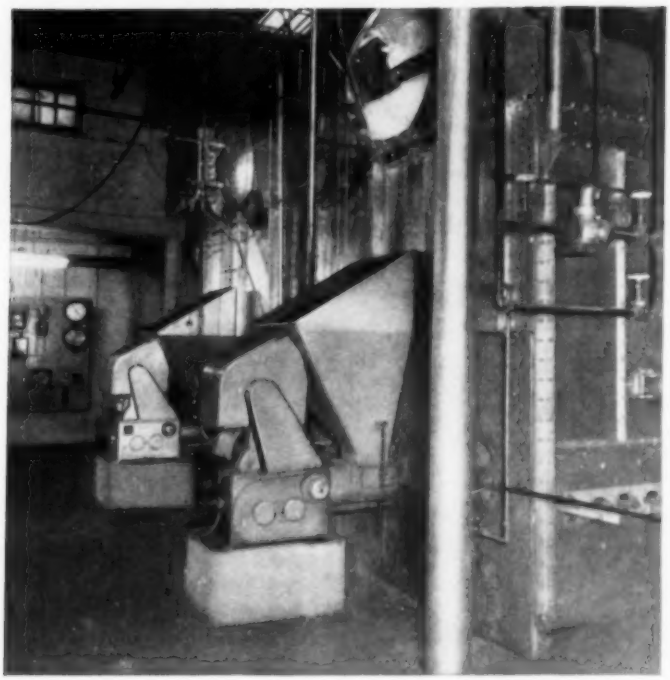
PACKING for shipment is an important part of the plant procedure at Gray and Dudley Co., Nashville, Tenn. This company manufactures an extensive line of ranges and heaters, and to have them reach the customer with no damage to finish or working parts involves more than ordinary consideration to the packaging procedure.

Until packaging was standardized by this large firm, each item of equipment was boxed on an individual basis. But now after standardizing upon shipping containers and adopting 17 designs and sizes of prefabricated wire-bound wood crates to pack a total of 47 different sizes and models, packing is on a production basis the same as unit fabrication.

Because overall packing cost has been reduced by 13 to 16 per cent, and protection of product in transit has been greatly improved, the editors feel the procedures employed are worthy of detailed description in Southern Power & Industry. The full story with ample illustrations will appear in a later issue.

"WE GET BIG SAVINGS BY BURNING COAL THE MODERN WAY!

Other fuels would cost us far more!"



says
Mr. A. J. Monta,
Plants Engineer,
The Welch Grape Juice
Company, Inc.,
Westfield, New York

"We analyzed the cost of coal and other fuels before modernizing our power plant. The result is this up-to-date coal installation that delivers steam at half the cost of competing fuels. *For economy you can't beat* bituminous *coal burned the modern way!*"

Modern coal-burning and handling equipment saves this plant more than 35% on labor alone! New stokers, boilers, controls and coal-handling equipment cut labor costs and save this plant 18% on fuel. The complete installation will pay for itself in about 6 years.

● Burning bituminous coal the modern way can save you money, too! Labor costs are cut to a minimum with up-to-date coal- and ash-handling equipment... modern combustion installations deliver anywhere from 10 to 40% more power from every ton of coal!

That's why, if you're planning to modernize or build a new plant, it will pay you to get the latest facts on coal. Let a consulting engineer show you how a modern coal installation designed to meet your specific needs can save you real money.

Here's something more! Today's bituminous coal customers get a better-prepared product—designed to meet their special requirements. And bituminous coal offers future dependability no other fuel can match. Reserves are virtually inexhaustible, and America's coal industry is the world's most efficient —your assurance of dependable supply of coal at relatively stable prices for years to come.

If you operate a steam plant, you can't afford to ignore these facts!

COAL in most places is today's lowest-cost fuel.

COAL resources in America are adequate for all needs—*for hundreds of years to come.*

COAL production in the U.S.A. is highly mechanized and by far the most efficient in the world.

COAL prices will therefore remain the most stable of all fuels.

COAL is the safest fuel to store and use.

COAL is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

BITUMINOUS COAL INSTITUTE
A Department of National Coal Association, Washington, D. C.

FOR HIGH EFFICIENCY FOR LOW COST

YOU CAN COUNT ON COAL!

We Still Pull Boners

WE ALWAYS insist that no operator answer a question that he is not sure of. But no such system is ever perfect.

We were starting up after installing a new water softener and moving one softener out over the top of a boiler and re-erecting it in a new location. We were ready to put our 1500 kw condensing turbine on the line. I had asked a man whether the condensate line valves were properly set so that the turbine condensate would return to the water softener through the vent condenser to the condensate deaerating chamber. He didn't answer, but went to check. On his return he reported that the valves were open and ready to go. We warmed the turbine up and had just gotten it on the line when the turbine operator yelled to say the condenser was filling with condensate. I ran down and opened a dump valve so everything was O.K.

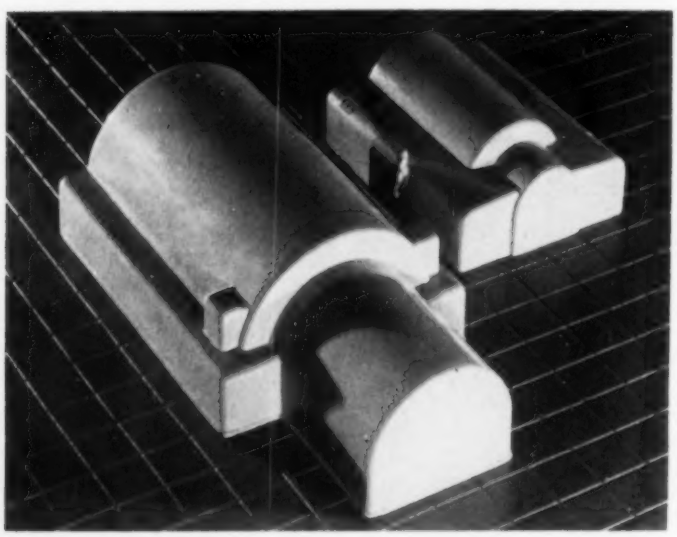
What happened? In checking the gate valves (which were old) to see if they were open, he turned the wheel about a turn to the right and then back to the left until it apparently back seated. What he had done was merely turn far enough to take the slack out of the stem and backed off until the valve just started to open. He thought it was back seating.

Another time, after having all circuit breakers on the switch panels checked and reconditioned I was synchronizing one turbine with another, that was on the line and an outside source of power. This synchronizing was all according to good practice. Turbine was up to speed, voltage checked and found correct, synchroscope plugged in and hand moving steadily and slowly in the direction indicating fast at about 3 minutes before 12 on the synchroscope. I closed the breaker.

Result? Everything went black. I had knocked the other turbine off the line, knocked out the outside source of power and we had nothing! Why? Because the plug used for synchronizing was the old four prong type. One side made contact and the other side didn't. The side making contact was enough to cause the 'scope hand to rotate and the lights to burn. I had synchronized out of phase. We now have new synchronizing switches.

Another time one of our new men had cleaned one side of a duplex fuel oil strainer on the discharge side of the fuel oil pump. The cover gasket dropped unnoticed to the floor. When the fireman on the next shift changed from one side of the strainer to the other he got a beautiful bath of Bunker "C" fuel oil. Another time a man forgot to close the drain valve and when the strainer was changed the result was a nice large pool of Bunker "C" on the floor.

Now we have signs posted all around with only one word on them "THINK!" Perhaps that will help. —*Leslie G. Rood.*



Supercharged Generator Design Progress

A scale model of the first completely supercharged steam turbine generator now under construction at Allis-Chalmers Manufacturing Company is shown alongside a model of a standard hydrogen cooled machine having the same rating.

This latest and most important step in the history of size reduction of steam turbine generators is a further development following the first use of supercharged cooling in the rotor of a 60,000-kw unit installed in 1951.

In this newest development in supercharging, cooled hydrogen is forced at high velocity through the conductors of *both* stator and rotor. Heat removing ability is so effective in this design that generator length and diameter are both cut to the remarkable ratios shown in the model. Exciter size has also been reduced through the use of an entirely new excitation system.

The first completely supercharged machine is being built for development and test purposes. It will have a nominal rating of 40,000 kw and a 60,000-kw rating at increased hydrogen pressure.

Send your ideas, methods and short-cuts to Southern Power & Industry. Payment is made for suitable material—a photo or rough sketch will make your idea more valuable.

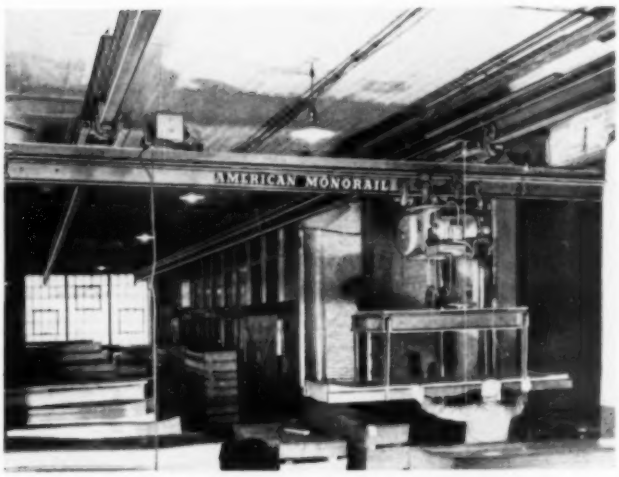
Articles from maintenance and production men in Southern and Southwestern plants are preferred. Material must not have appeared elsewhere nor been sent to another publication.

AMERICAN MONORAIL

• INCREASES PLANT CAPACITY AND PRODUCTION
• REDUCES HANDLING COSTS, DAMAGE AND LOSS

American MonoRail Engineers can show you how to get more profitable production out of your plant by systematizing material handling. Let them show you how to convert lost ceiling space to profit—how to eliminate obstructive storage around machines—lessen worker fatigue—reduce heavy load accidents—stop damage to product in motion.

Bring us your handling problems—American MonoRail can provide the equipment best suited to your needs.



See our booth at the
5th National
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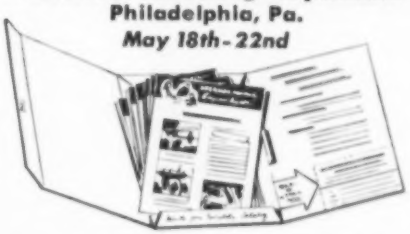

Send for New Case Study File

This brand new case study file contains the first of a continuing series of case studies covering many successful American MonoRail installations. Send today for original file. Future studies will reach you as published.

THE AMERICAN MONORAIL COMPANY

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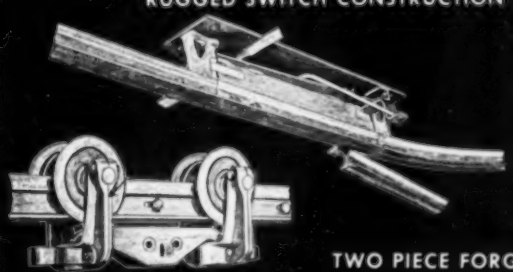
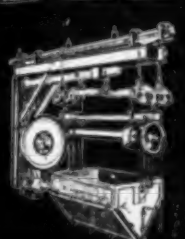
RUGGED SWITCH CONSTRUCTION



OVERLAPPING SPLICE

TWO PIECE FORGED YOKES



SCALE HOIST CARRIER

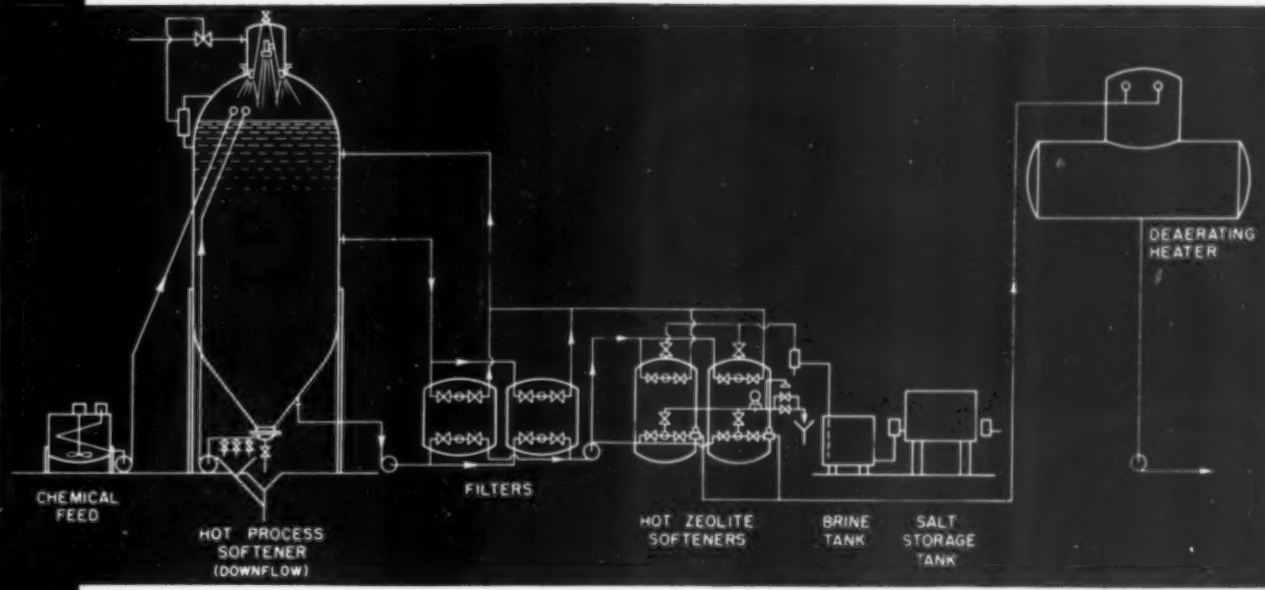
FREE MOVING CRANES

"We need an unbiased water conditioning recommendation. Let's get a proposal from

cochrane

Whether your water conditioning problem is simple or complex, call on Cochrane. Our *full range* of water conditioning equipment assures you *unbiased recommendations* and freedom from makeshift methods.

Cochrane recommendations are based on 90 years of specialized experience in water treatment. And those recommendations are without bias or prejudice—because Cochrane designs and builds *every kind and type* of industrial water treating equipment."—From Cochrane you get the plan and the products to give you water of the quantity and quality you want—with greatest economy. Before you decide on any water conditioning system, be sure to consult Cochrane water engineers.



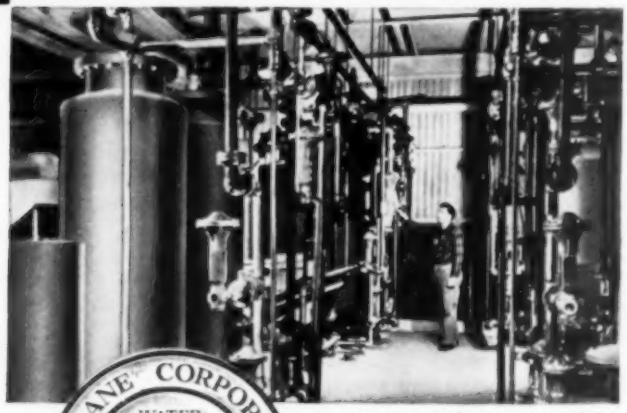
COCHRANE HOT PROCESS ZEOLITE SOFTENER COMBINES EFFICIENCY AND ECONOMY

Combination of a versatile Cochrane Hot Process Softener and a Zeolite second stage provides all the advantages of both systems. It is the most effective and economical means of reducing silica in boiler feedwater preparation. Low total Methyl Orange alkalinities are readily obtained, resulting in lower carbon dioxide in steam generated from this water.

Additional economies and benefits are chemical cost savings obtainable and simplicity of operation. Reason: Inexpensive salt is used for hardness removal instead of more costly soda ash and phosphate. Also, the hardness of the process effluent entering Zeolite units is usually quite low, permitting long Zeolite runs and infrequent regeneration.

LOW COST SOLUTION TO MINERAL SOLIDS PROBLEMS

For economical production of water that is comparable to commercially distilled water in low mineral solids, Cochrane demineralizers are available in multi-bed or mixed bed units of both manual or automatic design for any required capacity. Cochrane demineralizers embody sound design, superior workmanship and conservative ratings to assure maximum operating efficiency and longest life.



Cochrane Automatic Demineralizer producing water of less than 1.0 ppm total dissolved solids in large midwest plant.

Cochrane equipment covers the full range of water conditioning:

HOT PROCESS SOFTENERS
HOT AND COLD ZEOLITE SOFTENERS
DEAERATORS & OPEN HEATERS
DEMINERALIZERS DEALKALIZERS
DEGASIFIERS REACTORS & CLARIFIERS
CONTINUOUS BLOWOFF SYSTEMS
STEAM SPECIALTIES CONDENSATE RETURN SYSTEMS

To give you prompt consultation and service, Cochrane Water Engineers are strategically located in 29 cities throughout the United States. Write for the address of our office nearest you.

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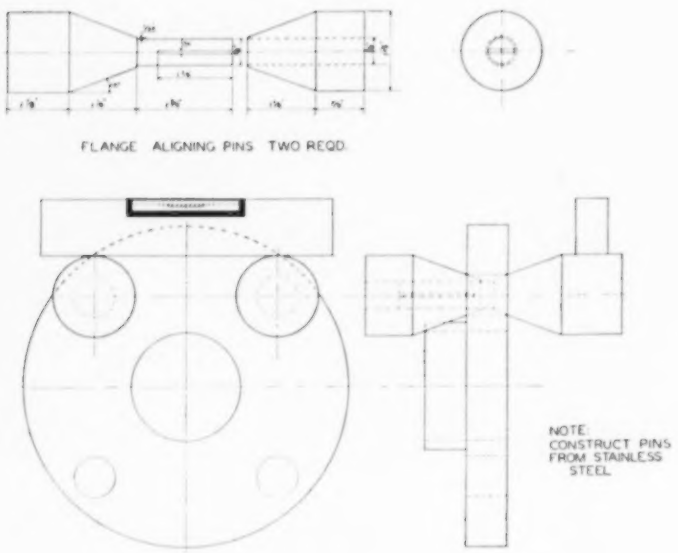


Positive Two Hole Flange Alignment

THIS shop kink, for the man-in-the-plant has been used for positive two-hole alignment of all standard type flanges.

Place each pin through two top holes of the flange and push the two parts snugly together. Beveled edges will bind against front and back of flange. Place a level on top of the pins and turn flange to perfect level and two hole.

Knowing that you are on a perfect two hole, you are now ready to tack companion welding fitting. This eliminates the necessity of having to double check the alignment. Line up pins were made from an old stainless steel pump shaft by one of our maintenance machinists. — *Kenneth T. Henson, Welder-Foreman, The Shamrock Oil and Gas Corporation, McKee Plant, Sunray, Texas.*

This shop kink by Kenneth Henson and Oscar Watson of The Shamrock Oil and Gas Corporation, Sunray, Texas, was presented at the Amarillo, Texas, Panhandle-Plains Regional Meeting of the Natural Gasoline Association of America.

Overhead Tackle in Small Plants

ISOLATED spots are constantly coming up where some form of special overhead tackle can be used to great advantage, and many times the gin pole is the only support possible. Often this device can be more readily used than many imagine.

For moderate loads a section of 3 in. pipe makes a handy pole, and with ropes and blocks at hand, an intelligent gang can soon be trained to put one up safely, use it, take it down equally safely, and put the material away quickly.

If wanted, two pipes can be screwed together safely, if the loads are not too heavy or the anticipated usage too rough. But if really severe work is expected, get a stronger pole—a wood pole or pipe with a special long clamp joint. Some steel tank companies use the latter for their erection work and if there is any more severe service anywhere, I have not seen it.

For guy lines, 3-4 in. hemp rope is adequate, and four lines work very nicely though some state laws require five. If convenient, use four, made up of two ropes with a clove hitch in the middle, slipped over the pole top, and pulling equally and safely both ways.

Attach your load tackle to the pole while it is on the ground, where it is easy. Spread out your guy lines, and with the bottom of the pole anchored, start it up by raising it off the ground so the fore guy can be used for pulling. Place one man at each side-guy-line to hold the pole sidewise; and one man at the back guy to check the pole when it comes erect. If hand power on your hoist is not enough, hook on a tractor or truck to pull up your loads.

Such a pole can be used for diverse operations and can be moved short distances while erect (tank crews do it all the time, by moving first the base, and then the guy lines to match). A bit of plank under the base keeps it from gouging into soft ground. The crew soon catches on to making minor adjustments in placing loads by slacking off guy lines to suit.

One job observed was the hoisting of wet concrete, some 20 ft. to pour in some high forms. There was not work enough to justify building a tower, so the gang stuck up a pole with a short boom lashed on the top so it could rotate 90 degrees around the pole. The hoist tackle was attached at the outer end of the boom, so loaded barrows could clear the pole, and arriving at the top could be swung in by hand and set on a landing platform, unhooked and be wheeled away to the forms. The concrete was bought ready mixed, delivered at the foot of the pole. A tractor furnished the power. A three part hitch, with two rings to slip over the barrow handles, one hook to engage the wheel, made a handy quick hitch—with only the hook needed on empties returning. The rig made a good job of it, especially as the tractor man loved to crowd the rest of the crew. The whole outfit was back in the storage racks inside a half hour after the last barrow went down.

Other examples could be cited galore where the gin pole is very useful, such as placing bridge timbers on top of their piers, unloading medium heavy castings from gondola cars, setting up or taking down small stacks, flagpoles, etc.

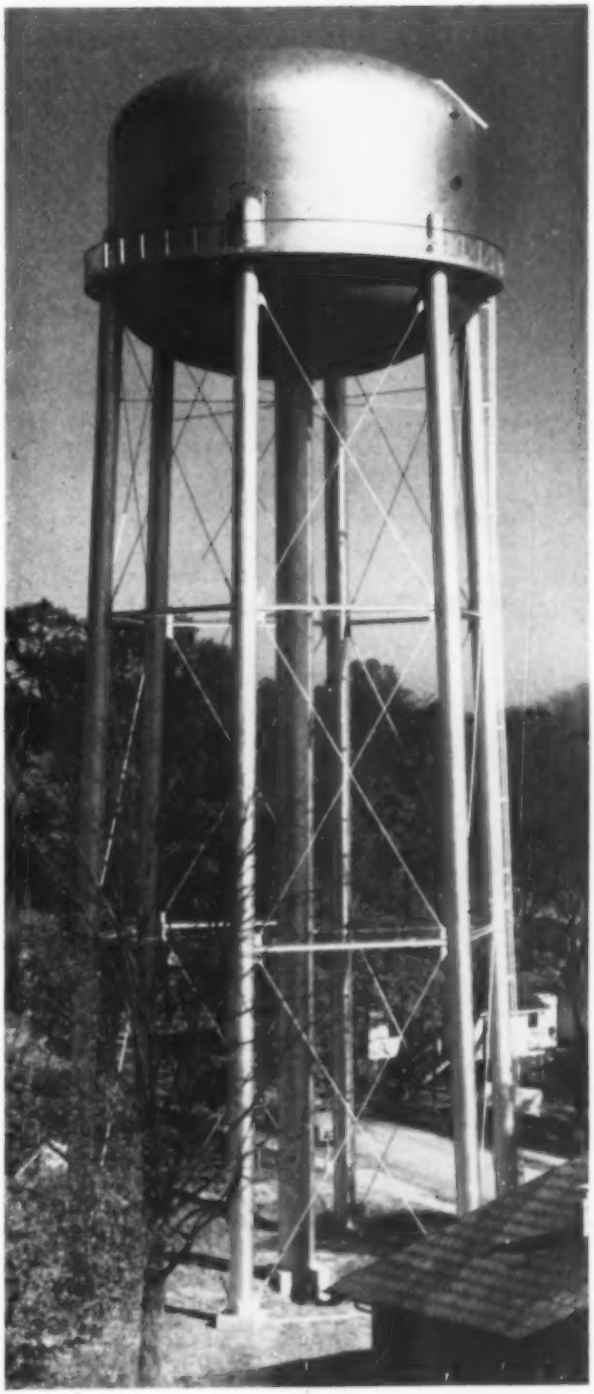
HORTON ELEVATED TANK

Assures Water Supply for General Service at Southern Mill

A 250,000-gal. Horton elevated tank with ellipsoidal bottom was installed to provide a dependable water supply for general service at the Abbeville Mills Corp. at Abbeville, South Carolina. Abbeville Mills, which manufactures fancy goods called Worsteray, uses approximately 1,000,000 gallons of water per day in its operations. Maximum water drawdown per minute is so high that it is impractical to carry the load directly on the municipal system.

Before the Horton tank was installed, a breakdown in the City pumping or filtering system would have meant an immediate work stoppage at the Mill. The Horton tank has erased this threat by providing a reserve sufficient to maintain plant operations for six or eight hours—a period long enough to repair any ordinary breakdown in Abbeville's municipal water system.

Horton ellipsoidal-bottom elevated water tanks for industrial service are built in standard capacities from 15,000 to 500,000 gallons. Where larger capacities are needed, Horton radial-cone bottom elevated tanks are built in standard sizes from 500,000 to 3,000,000 gallons. We also build standpipes and Waterspheres. For estimates or quotations, please write our nearest office. State the capacity required, location and height to bottom. There is no obligation on your part.



250,000-gal. Horton ellipsoidal-bottom elevated tank 100 ft. to bottom at the Abbeville Mills in Abbeville, S. C.

CHICAGO BRIDGE & IRON COMPANY

Atlanta 3.....2180 Healey Bldg.
Birmingham 1.....1531 North Fiftieth St.
Boston 10.....1044—201 Devonshire St.
Chicago 4.....2107 McCormick Bldg.
Cleveland 15.....2218 Midland Bldg.
Detroit 26.....1534 Lafayette Bldg.
Havana.....402 Abreu Bldg.
Houston 2.....2132 C & I Life Bldg.
Los Angeles 17...1545 General Petroleum Bldg.
New York 6.....3312—165 Broadway Bldg.
Philadelphia 3....1646—1700 Walnut St. Bldg.
San Francisco 4.....1531—200 Bush St.
Seattle 1.....1345 Henry Bldg.
Tulsa 3.....1628 Hunt Bldg.

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, *and* GREENVILLE, PA. *In Canada*—HORTON STEEL WORKS, LIMITED, FORT ERIE, ONT.

keep cool naturally

Breeze-Condition with Emerson-Electric Oscillators

Finger-tip Oscillation Adjustment

Finger-tip adjustment from non-oscillating position to any range of oscillation up to 90° is obtained by simply turning the knurled rim of the adjusting case. Adjustment is instantaneous and is accomplished without tools of any kind, and with absolute safety.

Stores, factories, institutions and offices everywhere keep cool *naturally* . . . they circulate the air with Emerson-Electric oscillating fans! These dependable 12″ and 16″ Overlapping-blade and Parker-blade models have exclusive oil-tight bearings and three-speed sliding switch in base. All carry the well-known Emerson-Electric 5-Year Guarantee. Specify Emerson-Electric Fans . . . get *natural* breeze-conditioning. (All models have ornamental guards. Overlapping-blade fans also available with spiral safety guards, as illustrated).

THE EMERSON ELECTRIC MFG. CO. • St. Louis 21, Mo.

FREE FAN CATALOG!

See 9 new models for '53 . . . get the facts about the most complete fan line in America. Write for Catalog No. 704.

EMERSON ELECTRIC
FANS • MOTORS APPLIANCES

Stapling in Place of Riveting

A LARGE Louisiana chemical company is using a heavy duty Bostitch ½C stapling machine in the fabrication of a large, heavy filter used in processing for the recovery of aluminum. The Bostitch stapling machine replaces singly placed copper and brass rivets. The company is enjoying a 75 per cent saving in material costs and the operation is several times as fast as the older riveting procedure.

Water Treatment

IN THE case of a large power generation plant in the Southwest tannin was being used to eliminate adherent deposits in boilers and heaters. Such deposits were especially objectionable in the heaters which raised the 100 per cent make-up water to 350 F.

Although the tannin apparently gave satisfactory results in the above respect, there were two objections to its use: a rather dark color developed in the boiler water, and more important, the tannin decomposed rather rapidly in the boiler.

Water treatment engineers were consulted regarding these problems and it was learned that Drew Organics were available which would eliminate the deposits in the boilers and heaters and at the same time would not have the objectionable features of the tannin, that is contribute a color and decompose. It was decided to use the Drew treatment and the following results have been obtained to date.

Use of the treatment has definitely prevented deposits in the heaters and the few inspections made to date have indicated that the boilers are in satisfactory condition. The treatment is much more stable than tannin and no objectionable dark color developed in the boiler water. The material requires less frequent additions and lasts for a longer period of time. Owing to the decreased decomposition rate there is little if any danger of objectionable or "organic" deposits forming any place in the high pressure boilers.

You'll get easier and less costly installation with reliable **RED TOP**

PIPE SUPPORT

Check these RED TOP features:

4 model sizes cover total load range from 60 to 10,000 pounds each size having travel range of 3 inches.

Low priced and available immediately from stock.

Easier and less costly to install properly, either as hangers or seats. No turnbuckles required.

Actual load, travel, variability and natural frequency of vibration are all indicated instantly on scale plate for a given pipe position.

Complete engineering and design service available to you through our affiliated company: **UNIVERSAL PIPING, INC.**

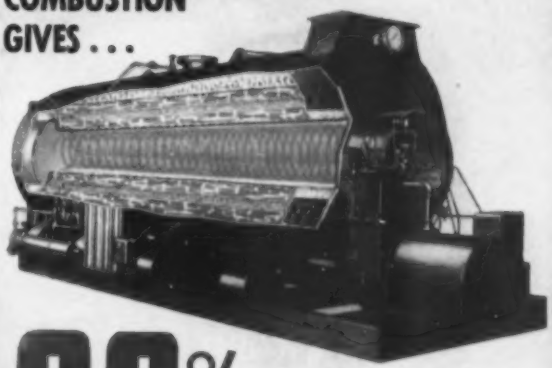
Represented by Mr. Ira Pulaski, Suite 1447-2025 Peachtree Street N.E., Atlanta, Ga.

C. H. LEIBFRIED *Manufacturing Corp.*

PIPE SUSPENSION DIVISION

EST. 1885 95-101 GUERNSEY ST., BROOKLYN 22, N.Y.

ONLY CYCLONIC COMBUSTION GIVES . . .



66% MORE POWER

per sq. ft. of heating surface

By reducing heating surface requirements from 5 to just 3 sq. ft. per B.H.P., Cyclonic Combustion produces 66% more power per sq. ft.—saves up to ⅓ the space of conventional package steam generators. Cyclonic Combustion is the revolutionary new flame control used exclusively in Cyclotherm steam generators. Flame characteristics are controlled in a revolving spiral vortex traveling the full length of the furnace to insure maximum heat transfer without direct flame impingements or hot spots. The cyclonic action of the flame accounts for a 65 to 75% heat transfer within the main fire-tube. This high rate of heat transfer enables Cyclotherm 2 pass generators to maintain a guaranteed minimum efficiency of 80% for any steam requirement.

Cyclotherm steam generators with patented Cyclonic Combustion offer these additional features: Full power operation from a cold start in 15 to 20 minutes; Savings up to 50% on maintenance; Greater fuel savings; Boilers designed for oil or gas operation from 18 to 500 h.p., 15 to 200 psi operation pressure.

Proved superior in thousands of installations, Cyclotherm steam generators with new Cyclonic Combustion offer the most efficient and compact package steam generator on the market today. Find out more about Cyclotherm and Cyclonic Combustion—write today for a free illustrated folder.

The Cyclotherm meets all state requirements and is built in accordance with A.S.M.E. and National Board Standards and bears the label of Underwriters Laboratories, Inc.

CYCLOTHERM

STEAM GENERATORS

Cyclotherm Division U. S. Radiator Corp.
Dept. 34
Oswego, New York

Please send without obligation my copy of "All Your Questions Are Answered by Cyclotherm."

NAME _____

FIRM _____

ADDRESS _____

CITY ZONE STATE

NEWS *for the South and Southwest*

Ice on the Lines

One of the worst storms of its kind in Potomac Edison Company history hit sections of PE territory January 8, causing outages to many customers.

These outages came in spite of the day and night work of company crews who went on the job as soon as the storm hit. These men were praised by President Smith for "their splendid work under the worst possible conditions."

Trouble started when a mass of warm air from the south came in over a cold front in the stricken area. Rain fell from the top layer, but changed to sleet before it hit the ground.

A tremendous build-up of ice then felled trees, ripped down cross-arms, wires and poles. In many cases, wires were found to have as much as four inches of ice weighting them down.

Measurements of other lines showed three pounds of ice on each foot of wire.

Repair work was carried out in freezing cold weather and their work was hampered by darkness and, in some instances, fog.

This section of a fallen line shows the tremendous amount of ice and snow that accumulated in a short period of time.

Safety Helmet Pays Off at Southern Pine Lumber

ALBERT R. SHATTO (right) was driving to work recently at the SOUTHERN PINE LUMBER COMPANY, DIBOLL, TEXAS, when he was forced off the road. His car flipped over, his head smashed the windshield. The car top was crushed down, pinning his head against the dashboard—but the protective MSA "Skullgard" he was wearing saved him from serious injury.

Albert Shatto (right) exhibits the Skullgard with Vernon Burkhalter, assistant safety director of Southern Pine Lumber Company, Diboll, Texas.

Engineers of MINE SAFETY APPLIANCES COMPANY, Pittsburgh, Pa., which developed the Skullgard, point out that the laminated plastic shell sacrifices itself to protect the wearer—absorbs and distributes heavy impact so the force is deflected from head and spine.

Westinghouse—St. Louis

RICHARD J. CONRAD has been named manager of public relations for the Southwestern District of the WESTINGHOUSE ELECTRIC CORPORATION with headquarters at ST. LOUIS.

Formerly a member of the Pittsburgh public relations staff of Westinghouse, Mr. Conrad will handle the firm's public relations activities throughout seven states and parts of six others.

J. C. Riley Co., Houston

JOHN C. RILEY has reactivated his original firm, J. C. RILEY COMPANY, 2438 South Blvd., HOUSTON, TEXAS; serving as Factory Representative in the Southwest for THE C. M. KEMP MFG. CO., Dryers, Inert Gas Generators, Carburetors, Immersion Heaters: READING CRANE & HOIST CORP., Overhead Hand and Electric Hoists and Cranes: INTERNATIONAL ENGINEERING, INC., Mixers, Agitators, Process Equipment: MIDWEST ALLOYS, INC., Alloy Castings, Flanges, Fittings.

Goodyear—Gadsden, Ala.

ROBERT C. CASE, technical superintendent of the GADSDEN, ALA. plant of THE GOODYEAR TIRE & RUBBER COMPANY, has been returned to Akron, Ohio, to assume new duties as chief engineer of the tire design division of the company.

M. H. LAATSCH, chief chemist at Gadsden, moves into the post vacated by Case; and J. L. RYAN, assistant chief chemist, moves into Laatsch's old position. At the same time, R. R. ADAMS was named manager of technical service at Gadsden.

FUTURE EVENTS Of Engineering Interest

AMERICAN SOCIETY OF MECHANICAL ENGINEERS, C. E. Davies, Sec'y, 29 West 39th St., New York, N. Y.
April 12-15, Region VIII Annual Meeting, Jung Hotel, 1500 Canal St., New Orleans 12, La.

SOUTHERN ASSOCIATION OF SCIENCE AND INDUSTRY, Al Bourgeois, Convention Manager, Hotel Roosevelt, New Orleans, La.
April 20-21, Southern Industrial Wastes Conference, Hotel Roosevelt, New Orleans, La.

AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Prof. M. G. Northrup, Gen. Chm. Meeting Committee, University of Louisville, Louisville, Ky.
April 22-24, Southern District Meeting, Hotel Seelbach, Louisville, Ky.

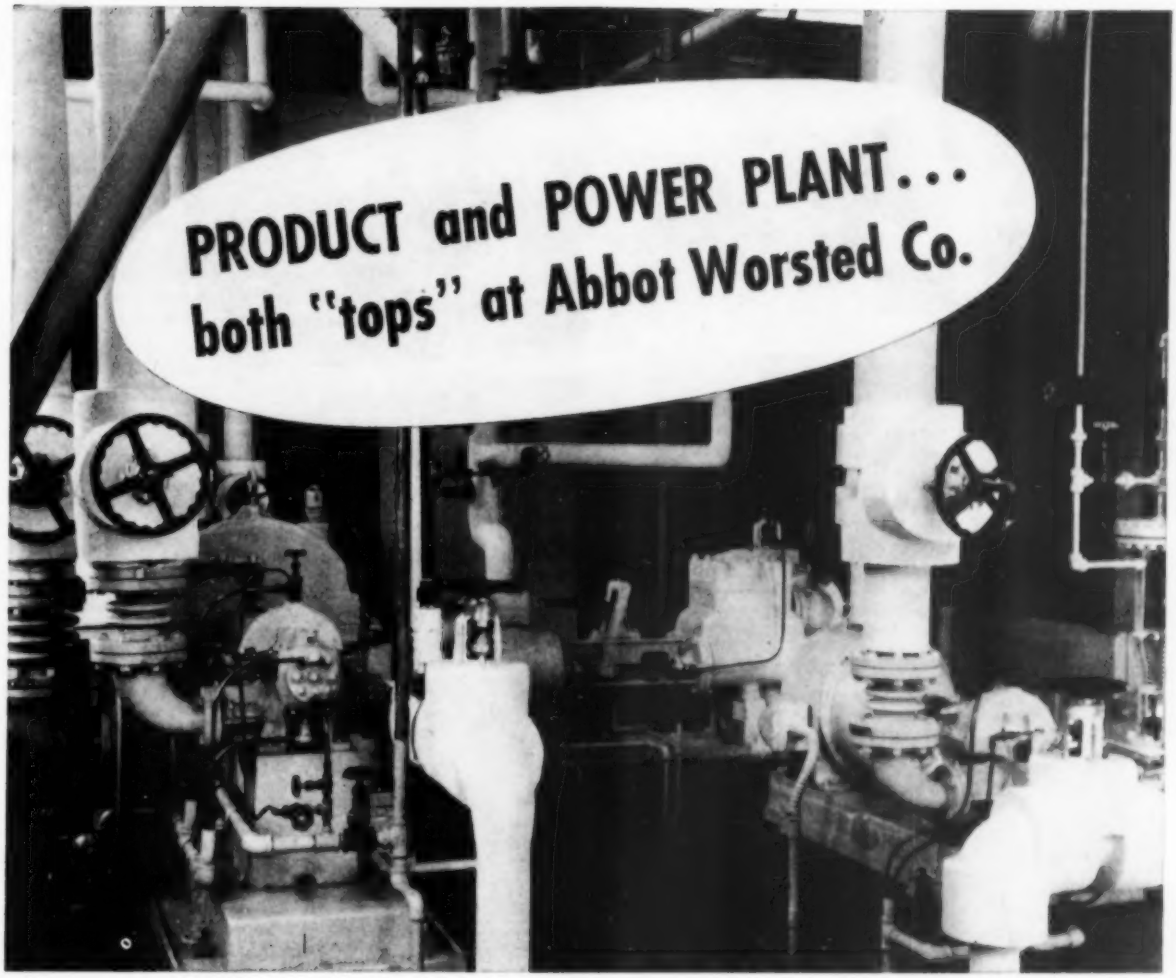
NATURAL GASOLINE ASSOCIATION OF AMERICA, Wm. F. Lowe, Sec'y, 422 Kennedy Bldg., Tulsa 3, Okla.
April 29-May 1, 32nd Annual Convention, Rice Hotel, Houston, Texas.

INTERNATIONAL PETROLEUM EXPOSITION, Wm. B. Way, Gen. Mgr., Box 5246, Donaldson Station, Tulsa, Okla.
May 14-23, Exposition, Tulsa, Okla.

MATERIALS HANDLING SHOW, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
May 18-22, Fifth National Materials Handling Exposition and Conference, Convention Hall, Philadelphia, Pa.

EXPOSITION OF BASIC MATERIALS FOR INDUSTRY, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.
June 15-19, Exposition and Conference, Grand Central Palace, New York 17, N. Y.

AMERICAN WELDING SOCIETY, National Secretary, 33 West 39th St., New York 18, N. Y.
June 16-19, National Spring Technical Meeting with Welding and Allied Industry Exposition, Shamrock Hotel and Hall of Exhibits, Houston, Texas.



Boiler Feed Pumps in foreground are rated 90 G.P.M., 460 ft. head. Steam Pump in background is a Warren "Realwear," 7½ x 5 x 10.

THIS yarn mill, located at Forge Village, Mass., enjoys an enviable reputation in the exceptionally fine spinning of yarns for worsted, camel hair, mohair, and combined synthetic fabrics.

Now they can also look with pride upon an excellent new Power Plant, highly modern both as to equipment and building. Engineering was in charge of Joseph C. Bogue, Consulting Engineer, 6 Leonard Street, Belmont, Mass., and in cooperation with A. L. Simpson, Plant Engineer.

Warren Pumps, exclusively, both Cetrifugal and Reciprocating, were selected for Boiler Feed and other Plant services.

Modernization or expansion . . . Power Plant or Process . . . discriminating buyers specify:

P-29

WARREN PUMPS

WARREN QUIMBY PUMPS

WARREN STEAM PUMP COMPANY, INC., WARREN, MASSACHUSETTS

Centrifugal . . . . . Reciprocating . . . . . Rotary

ELECTRO DYNAMIC
Extra dependable industrial motors
1 TO 250 HORSEPOWER (N.E.M.A. STANDARDS)
Extra large "free-flo" air channels.
Liberal size grease lubricated bearings.
One-piece cast iron frames.
Permanently aligned cast iron brackets.
Also a complete line of Direct Current motors and generators
ELECTRO DYNAMIC
DIVISION OF GENERAL DYNAMICS CORPORATION
BAYONNE, NEW JERSEY
HEART of the motor
3. Extra high-frequency testing of insulation between turns.
4. Extra care in fitting coils into stator.
The WINDING is the
1. Extra insulation in stator slots and between phases.
2. Extra impregnations and bakings of the wound stator.
QUALITY SINCE 1880
WRITE TODAY FOR NEW ILLUSTRATED CATALOGUE NO. 472

AIEE—Louisville, Ky.

"Industry Moves South" will be the theme of the Southern District Meeting of the AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS in the Hotel Seelbach, LOUISVILLE, KY., April 22-24. Prof. M. G. Northrup, of the University of Louisville is general chairman of the Meeting Committee. A Student Branch Meeting also will be held at that time and the Institute's Committee on Domestic and Commercial Applications will sponsor a session on appliances.

Attending the three-day meeting, which will include technical sessions, an entertainment program and inspection trips, will be national officers of the Institute and electrical engineers from the Southern District, which embraces the states of KENTUCKY, VIRGINIA, TENNESSEE, NORTH and SOUTH CAROLINA, MISSISSIPPI, LOUISIANA, ALABAMA, GEORGIA and FLORIDA.

Inspection trips will be to plants manufacturing air cleaning equipment, electrostatic precipitation, domestic electric appliances, high frequency dielectric heating, foundry and forging, newspaper and color printing, tobacco processing, cigarettes and distillery operations.

ASME Award for J. P. Warren, Dow Chemical, Freeport, Tex.

J. P. WARREN, power consultant at DOW CHEMICAL COMPANY, FREEPORT, TEXAS, received the ASME Certificate of Merit from the South Texas Chapter of the American Society of Mechanical Engineers recently in Houston.

Warren's contributions to mechanical engineering and his work during 30 years of ASME membership were cited as the basis for his selection to receive the award.

Before going to Texas, Mr. Warren, who has served as chairman and vice chairman of the South Texas Chapter, was active in organizing the West Virginia state section of ASME, and served as its first chairman. He also served as state chairman of ASME in Florida.

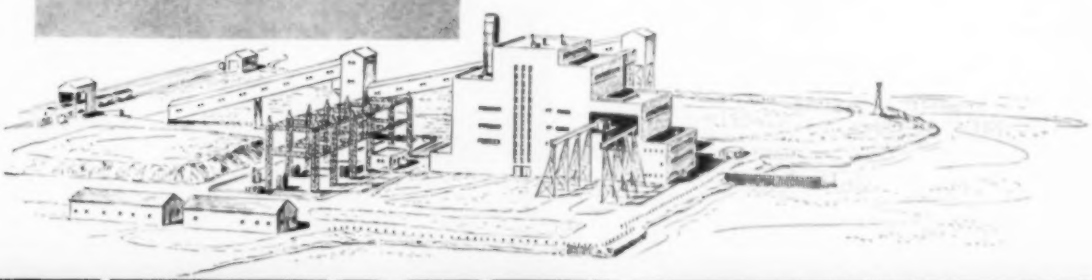
Farr Names Harworth—Tenn.

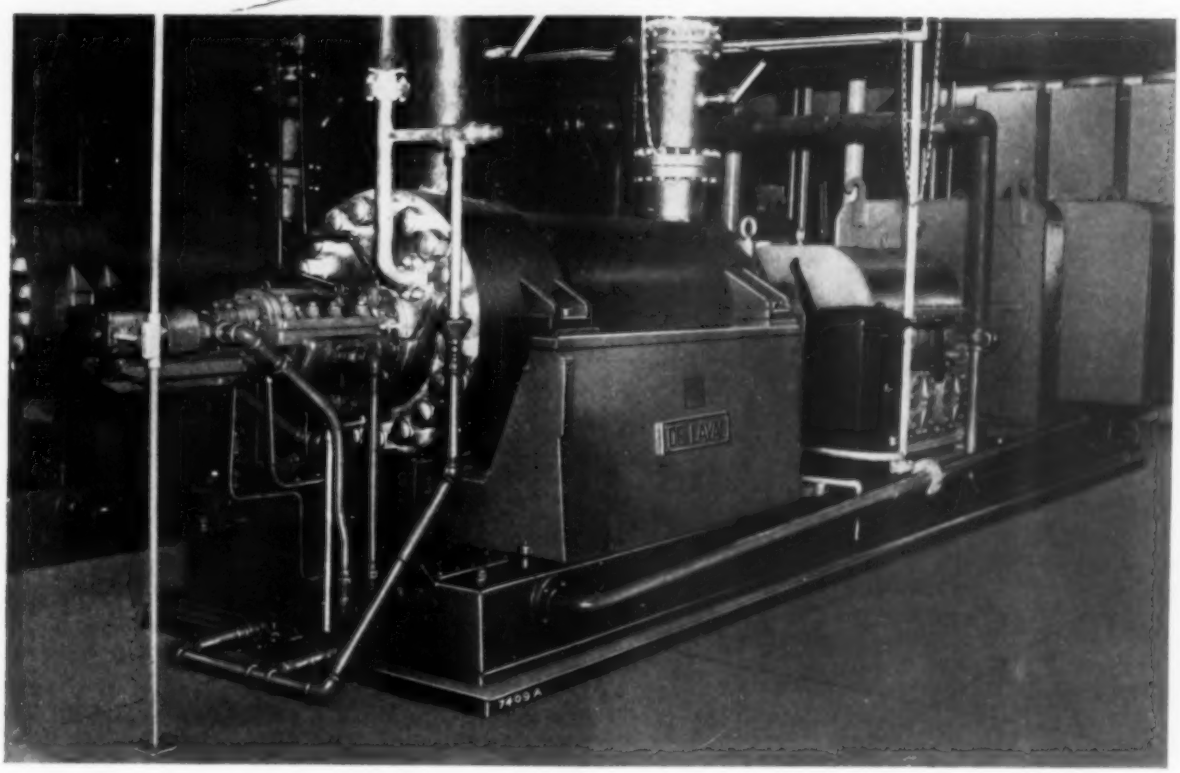
FARR COMPANY of Los Angeles, manufacturers of filters and air filtration equipment, announce the appointment of DONALD S. HARWORTH as Southern Division Sales Manager with headquarters at NASHVILLE, TENNESSEE. Mr. Harworth is a mechanical engineer and a graduate of the General Motors Institute.

DE LAVAL

BARREL TYPE
BOILER FEED PUMPS

on the job at Danskammer Point





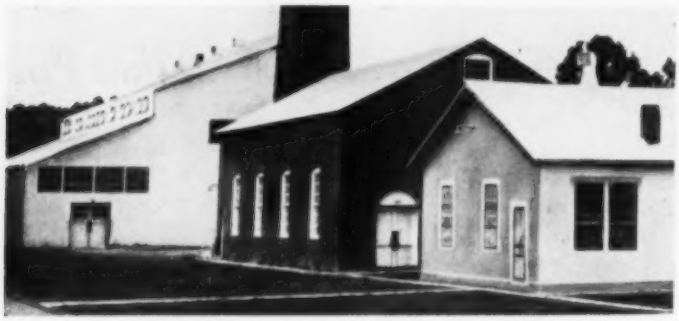
These two De Laval 11-stage barrel type boiler feed pumps are now helping to produce power for the Danskammer Point Steam Station of the Central Hudson Gas and Electric Corporation. Both pumps, one of which is used for standby service, are sized for full boiler load and will deliver 1,400 gpm of 326F water against 2,155 psig discharge pressure. Two more same size De Laval pumps have already been ordered for the second main unit of the Danskammer Station.

De Laval barrel type boiler feed pumps meet all the requirements of high pressure boiler feed service. They can be thrown on the line quickly without long preliminary warming up. They are not affected by sudden temperature changes. The distinctive De Laval design assures years of reliable service with minimum maintenance.

DE LAVAL *Boiler Feed Pumps*

DE LAVAL STEAM TURBINE COMPANY
817 Nottingham Way, Trenton 2, New Jersey

DL 178



Marlow Pumps Operating Arkansas Factory

Here's a partial view of the 16,000 sq ft branch factory of MARLOW PUMPS at De Queen, Arkansas. Marlow, manufacturer of centrifugal pumps, emphasizes that the location in Southwestern Arkansas, permits fast delivery to all sections of the Southwest.

In addition to manufacturing and assembling pumps in De Queen, for the irrigation, petroleum, and contracting industries, the new factory will also carry a complete inventory of all Marlow pumps as well as replacement parts. Sales and engineering staffs will use the new plant as a regional headquarters.

Allied Chemical and Dye New Virginia Plant

The National Aniline Division of ALLIED CHEMICAL AND DYE CORPORATION has acquired a six hundred acre tract north of Hopewell, Virginia, on James and Appomattox Rivers. This will be the site of a new plant for the manufacture of staple fiber and continuous filament nylon. Nylon polymer will also be produced in suitable form for molding into plastics. The Plant will consist of a series of one and multiple story buildings to include process machinery and a complete unit for 20,000,000 pounds per year production of nylon based on a Caprolactam Polyamide process. General contractor for this $27,000,000 project is Daniel Construction Company of Greenville, South Carolina, and Birmingham, Alabama.

The project will include a power house, pumping station and other mechanical units. Completion is expected in about 24 months. Work is scheduled to start immediately.

New plant of Plymouth Cordage Company at 600 Ponchartrain Drive, New Orleans.

Paul C. Krueger, Mgr. New Orleans plant, Plymouth Cordage Company.

Modern New Orleans Plant of Plymouth Cordage Manufacturing Rope and Twine

The PLYMOUTH CORDAGE COMPANY'S new plant at 600 Ponchartrain Drive, Jefferson Parish, NEW ORLEANS, LOUISIANA, which began limited operations in June of 1952, was opened with formal ceremonies in December 1952.

The new plant, under supervision of Plant Manager PAUL KRUEGER, employs approximately 120 people for the manufacture of rope, tying twine binder and baler twine.

Situated on a 21-acre site eight miles from the center of New Orleans, the plant has 150,000 sq ft of floor space in addition to the manufacturing mill. Facilities include a warehouse for raw fiber and another for the finished product. A fourth section of the plant houses the machine shop, boiler room and emulsion room, where chemical treatments for rope and twine are developed.

The company's South District Sales Office, formerly located at St. Charles Avenue, is now located at the new site and continues under the management of CHARLES H. BABINGTON, a native of Louisiana. Mr. Babington attended Millsap and Vanderbilt Universities, and received a B.A. degree from the latter. He was in the advertising and sales departments of the Firestone Tire & Rubber Company before joining Plymouth Cordage Company in 1931. He was named manager of the Southern District in 1948.

Mr. Krueger was graduated from Tulane University in 1940. Prior to joining Plymouth Cordage in 1951, he worked with Gaylord Container Corporation in Bogalusa.

Plymouth began operations in New Orleans in 1947, and in 1950 began construction of the new plant capable of providing facilities for further expansion.

HERE'S YOUR *Complete* STEAM PLANT

- One purchase, backed by undivided responsibility.
- Shipped completely assembled after factory tests to assure highest operating efficiency.
- More than 80% thermal efficiency guaranteed.
- 4-pass design provides 5 sq. ft. of heating surface per b.h.p.
- Induced draft fans which are built-in eliminate the need of an expensive chimney.
- Simple installation requires no special foundation.
- Clean, quiet operation.
- Heavy-duty, rugged construction assures long-lived dependability.
- Burner equipment to suit your fuel: gas, oil or both.
- 18 sizes from 20 to 600 b.h.p. for pressures up to 250 p.s.i., or for hot water heating.
- For complete details, write today for catalog 511.

SUPERIOR STEAM GENERATORS

SUPERIOR COMBUSTION INDUSTRIES, Inc.

Factory: Emmaus, Pa.

***Executive Offices:** Times Building, Times Square, New York 18, N. Y.*

ASME—New Orleans

Region VIII of the AMERICAN SOCIETY OF MECHANICAL ENGINEERS meets in NEW ORLEANS April 12-15. Sections participating are: Kansas City (Missouri); Mid-Continent (Tulsa, Oklahoma); New Orleans; North Texas (Dallas); Rocky Mountain (Denver, Colorado), and South Texas (Houston). Headquarters are at the Jung Hotel, and Mallard Seago is General Chairman of the Committees.

G.E. Reorganizes Division

The Small and Medium Motor Department of the GENERAL ELECTRIC COMPANY has been discontinued and its operation has been decentralized into three new product organizations. A divisional marketing department was also established to facilitate a unified approach to all division marketing policies.

The four new departmental organizations and their managers are: Marketing Department, WALKER H. HENRY, manager; Medium Induction Motor Department, OLAF F. VEA, general manager; Direct Current Motor and Generator Planning Study, OSCAR L. DUNN, manager; and Synchronous and Specialty Motor and Generator Department, FRED B. HORNBY, general manager.

Headquarters for the first three organizations will be at Schenectady, N. Y., and the Synchronous and Specialty Motor and Generator Department will be located at the G. E. Lynn (Mass.) River Works.

There's NO Seal Like Rectorseal
...for preventing connection leaks

● Rectorseal has been proved by more than 15 years use by the oil industry, where it has been subjected to severest leak-proofing conditions. Rectorseal #2 is specially compounded to meet the specific requirements of industry.

INSOLUBLE IN WATER AND ALL PETROLEUM FRACTIONS

Rectorseal #2 holds natural, manufactured and LP-Gases . . . natural gasoline, butadiene, synthetic rubber and other petroleum based chemicals; also gasoline, diesel and fuel oil. It is unaffected by refrigerant gases, freon, sulphur dioxide. Will not contaminate drinking water. Use it on piping for any of these commodities with complete confidence of leak-proof connections.

EASY TO APPLY . . . ECONOMICAL

Rectorseal #2 is available in convenient, easy-to-use ¼, ½ and 1 pt. brush-top cans . . . also quart and gallon friction-top cans. Thin in the can, it thickens in the joint to a plastic elasticity that maintains a leak-proof seal for the life of the connection. Never hardens or becomes brittle . . . never seizes the threads.

● WRITE FOR ¼ PT. FREE TRIAL CAN TODAY!

and use Rectorseal #2 on your next job. Prove to yourself, "There's no seal like Rectorseal" for preventing connection leaks.

RECTORSEAL, Dept. "V"
2215 Commerce St., Houston 2, Texas

RECTORSEAL
PAT. T. M. REG. U. S. PAT. OFF.
NUMBER TWO

Furnas Electric Names Meyer

THE FURNAS ELECTRIC COMPANY of Batavia, Ill., manufacturers of electric motor controls, announce the appointment of WALTER A. MEYER as general sales manager, in charge of sales and publicity.

Walter A. Meyer, now general sales manager, Furnas Electric Company.

Mr. Meyer was formerly with Allis-Chalmers, Milwaukee, in sales and distribution of products in their Apparatus Department and over a period of years held the posts of manager of General Purpose Equipment, Manager of Dealer Sales, and assistant manager, Texrope Drive Department which included sales, advertising and engineering activities.

Ohmart—Southwest

THE OHMART CORPORATION, Cincinnati 38, Ohio, has announced the opening of a new District Sales Office in DALLAS, TEXAS.

District Manager of the territory is JOHN W. GODBEY. Mr. Godbey is a member of the American Oil Chemists' Society and the American Society of Mechanical Engineers, and has had extensive experience in practical engineering in the chemical process industries field. Previous to joining Ohmart he was with the Girdler Corp.

Utica Drop Forge, Mid-South

UTICA DROP FORGE AND TOOL CORPORATION, 2500 Whitesboro St., Utica 4, N. Y., has announced the appointment of PAUL L. THORNBURG as factory representative in the area of VIRGINIA, NORTH CAROLINA, SOUTH CAROLINA and TENNESSEE.

Paul L. Thornburg, Mid-South factory representative for Utica Drop Forge and Tool Corp.

Mr. Thornburg, a manufacturers' representative since 1948, has formerly carried Utica tools along with several other lines. In his new capacity, however, he will handle only the Utica line of pliers, adjustable wrenches, and screwdrivers, contacting industrial users and hardware retailers in his area.

Allis-Chalmers—Tenn., Ky.

JOHN A. BROWN, JR. and DONALD L. FITZSIMMONS have been named sales representatives in ALLIS-CHALMERS general machinery division's KNOXVILLE and LOUISVILLE district offices.

Brown, an electrical engineering graduate of Vanderbilt University, has been an application engineer in Allis-Chalmers substation section since 1950.

Fitzsimmons recently completed Allis-Chalmers training course for graduate engineers.

G.E. Supplies Memphis Eqpt.

The new Thomas H. Allen Pumping Station of MEMPHIS, TENN., will increase the city's existing water supply by 50 per cent. Expected to be completed in 1953, the new all-electric station will supply 30,000,000 gallons of water a day.

The GENERAL ELECTRIC COMPANY is supplying the major share of the electric equipment for the station which will hydraulically parallel the existing Parkway and Sheahan Stations, both steam-operated.

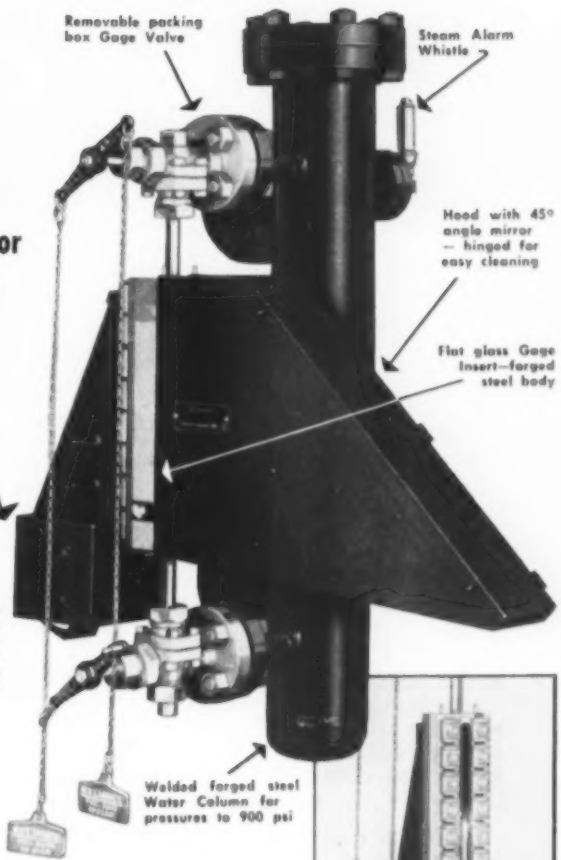
Your principal source

for modern Water Columns and Water Gage Equipment-

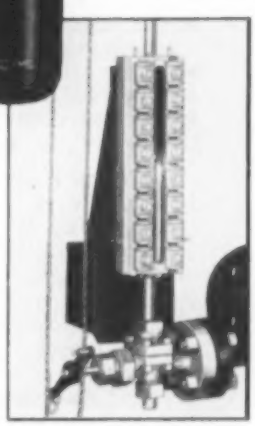
Reliance

New...

Mercury Lamp Gage Illuminator for extra-clear and distant reading


Removable packing box Gage Valve
Steam Alarm Whistle
Hood with 45° angle mirror — hinged for easy cleaning
Flat glass Gage Insert—forged steel body
Welded forged steel Water Column for pressures to 900 psi

Recommended for conditions where gages are 40 ft. or more from operating level, or for extra bright meniscus image. See cut at right.



Reliance Water Columns for any working steam pressure assure you the utmost in dependability. High and low water level alarms are available on columns for pressures to 900 psi. Standard and special columns and complete safety gage equipment are made for pressures to 2500 psi.

The Reliance Gauge Column Company
5902 Carnegie Avenue — Cleveland 3, Ohio

The name that introduced safety water columns....in 1884

Reliance®
BOILER SAFETY DEVICES

news for the South and Southwest *(continued)*

Pangborn Corp.—Maryland

JOHN C. PANGBORN, JR., son of 1st vice-president John C. Pangborn, has been appointed Hagerstown District Sales Manager by the PANGBORN CORPORATION, HAGERSTOWN, MD.

John C. Pangborn, Jr.

The Hagerstown sales district was recently formed and consists of a number of counties in central Pennsylvania, most of WEST VIRGINIA with bordering counties in Ohio and KENTUCKY and the western section of MARYLAND. Headquarters for this district will be at the Pangborn Hagerstown plant.

Mr. Pangborn's promotion follows years of experience in the blast cleaning and dust control fields. He has served as an erector of Pangborn machines, as manager of the erecting and service division, as sales engineer, and from 1951 until his recent promotion he has served as expediter and assistant head of department in purchasing.

Materials Handling Show

All available display space at the NATIONAL MATERIALS HANDLING EXPOSITION, which will be held at Convention Hall, Philadelphia, May 18 to 22, has been assigned, it was announced by Clapp & Poliak, Inc., New York, founders of the show. A total of 284 companies will exhibit.

Thousands of new models of materials handling equipment, valued at more than $10,000,000, will be on display. Machines will include lift and fork trucks, both gasoline and battery powered, conveyors, both portable and permanent, hoists, monorails, cranes, tractors, trailers, hand trucks, stacking units, portable elevators, skids, pallets, and their respective accessories.

Acting as sponsor for the exposition will be the MATERIAL HANDLING INSTITUTE, organization of handling equipment manufacturers. The AMERICAN MATERIAL HANDLING SOCIETY, composed of executives of companies which use mechanical handling systems, will conduct a conference concurrently with the show.

The conference, described as a "workshop" for executives in the field, will include discussions of general problems of materials handling in addition to seminars.

Houston—U. S. Second Port

THE PORT OF HOUSTON retained its title of "Nation's Second Port" for the fourth successive year during 1951, according to official statistics just released by the U. S. Army Engineers' Corps.

Houston's total commerce of 43,774,781 tons for that year was exceeded only by New York Harbor.

BALTIMORE took the third place spot; Philadelphia was fourth; and NEW ORLEANS fifth.

GOT A PROBLEM?

BOILER MAINTENANCE?
POWER PLANT REFRACTORIES?
FURNACE LININGS?
SMOKE STACKS?
WATER GAS PLANTS?
INCINERATORS?

Jot it down here:

Anywhere you use or generate heat, Ironton will be able to help you do a better job by (1) saving labor costs on refractory installations; (2) recommending ways to get longer service from refractories; (3) telling you about new developments in refractory materials. It costs you nothing to get Ironton expert advice on your problem. We are a small "custom service" company, ready to treat every inquiry personally, promptly.

HELPFUL BULLETINS or valuable technical data on slag-and-abrasion-resistant fire clay brick, plastic refractories, high temperature cements, wash coatings for boiler walls, castable refractories, burner blocks, etc., will be sent to you without obligation.

Representatives in the South:
Baltimore, Md., MUlberry 7184
Charlotte, N. C., Phone 55-285
Chattanooga, Tenn., Phone 7-6697
Jacksonville, Florida, Phone 3-5586
Miami, Florida, Phone 82-5782
Silver Spring, Md., JUniper 7-5468
Kentwood, La., Phone 2191

Call or write

RELIABLE REFRACTORIES

THE IRONTON FIRE BRICK COMPANY
IRONTON, OHIO

Moore Joins Eggelhof, Texas

EDWARD L. MOORE is now sales engineer for the DALLAS office of EGGELHOF ENGINEERS.

Prior to joining Eggelhof in September, 1952, Mr. Moore was with the Submarine Signal Co. in Boston. He has done research and special service in radar and sonor for the U. S. Navy and wholesale sales work for RCA Victor and Admiral products.

Mr. Moore was born in Waco, Texas. He attended Massachusetts Institute of Technology and received his degree in mechanical engineering and electrical engineering in 1945.

Lincoln Engrng.—St. Louis

LINCOLN ENGINEERING COMPANY, 5701 Natural Bridge Ave., ST. LOUIS 20, MISSOURI, has announced the following personnel changes: T. V. PICRAUX, formerly sales manager of the Industrial Division, has been appointed to the position of Production Manager of both the company's plants. ALBERT J. GRUENEWALD, formerly a sales engineer, fills the post vacated by Mr. Picraux.

ROBERT E. REDENBAUGH, who has served in the Product Design and Sales Engineering Departments since 1942, has been appointed manager of the Original Equipment Division.

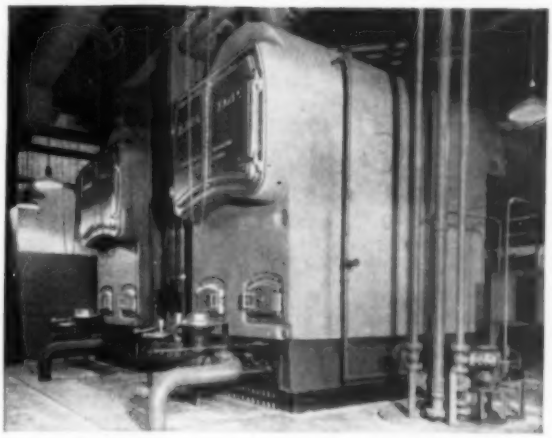
Minneapolis-Honeywell Names Southern Field Sales Repr.

FRANK DAY, VINCENT LO SCALZO and V. L. EVANS have recently been assigned to field sales posts for the Valve Division of MINNEAPOLIS-HONEYWELL REGULATOR COMPANY.

Day will handle industrial valve sales in the NEW ORLEANS area, Lo Scalzo in KANSAS CITY, MO. and Evans in WILMINGTON, DELAWARE.

Day and Lo Scalzo are recent graduates from the firm's instrument and valve training school in Philadelphia. Evans transferred from that office where he had specialized in food industry sales.

MORE ENGINEERING
MORE MATERIAL
MORE EXPERIENCE
MAKE THE DIFFERENCE



KEWANEE
STEEL BOILERS

Kewanee Boilers have led their field for more than 85 years because Architects, Engineers, Contractors and owners know they *get more from them . . .* and that is true because *Kewanee puts more into them.*

Check the measurements and specifications shown in every Kewanee catalog. You'll find more of all the features which make a boiler efficient and dependable . . . large, high fireboxes; generous heating surfaces; unimpeded water ways; unobstructed steam release areas; plenty of space for reserve steam. That's why one finds Kewanee Boilers "on the job" providing heat or power or process steam in America's finest buildings and industrial plants.

KEWANEE-ROSS CORPORATION
Division of American Radiator & Standard Sanitary Corporation
KEWANEE, ILLINOIS

news for the South and Southwest *(continued)*

TEMCO Personnel Changes

TEMCO AIRCRAFT CORPORATION, Box 6191, Dallas, Texas, has announced the promotion of W. N. HALL, formerly assistant superintendent, to the position of superintendent. Hall, who has been with TEMCO since 1945, will be in charge of 15 production departments, including T-35 Buckaroo assembly, drop hammer, foundry, machine forming, heat treat, plastics, welding, sheet metal fabrication, subassembly and processing.

HERMAN MULLER, formerly assistant superintendent, has been promoted to superintendent, over all night operations.

ROBERT L. LEWIS, formerly assistant superintendent, has been named assistant manager of manufacturing control. Lewis joined the company in 1950 as supervisor of manufacturing analysis, rising through the ranks of general supervisor and assistant superintendent to his present position.

The company also announced that WALTON M. DALLAS has been named manager of manufacturing control; GENE B. SPAULDING, formerly guidance group engineer, has been promoted to superintendent of electronics; and LEON W. MASON, formerly staff assistant, has been promoted to assistant superintendent of electronics.

Southwest Research Institute Solves Ind. Housing Problems

Housing problems worrying companies with expanding working personnel, or entire areas which are growing rapidly and haphazardly, are the special objective of a new service offered by SOUTHWEST RESEARCH INSTITUTE, SAN ANTONIO, TEXAS.

The nonprofit scientific research organization has noted that many companies are constructing new manufacturing facilities in areas which are located some distance from population centers. Up to the present, there has been no single experienced and impartial agency in the United States to assist growing corporations and expanding municipalities to cope with this situation. Now, however, the Institute is supplying this community development service on the same basis that it performs technical research for companies and government agencies—that is, on an at-cost, nonprofit basis. Available to any company, it is not limited to any particular size of proposed housing development, or to any geographic area.

Midwest Piping—St. Louis

The name of the "Midwest Piping and Supply Co., Inc.," 2nd & Barry Sts., ST. LOUIS 4, MO., has been changed to MIDWEST PIPING COMPANY, INC.

This name change recognizes the fact that Midwest has grown away from the supply business. While the company still conducts supply operations, it is a comparatively small part of the business. Major activity is the fabrication and installation of piping and the manufacture of welding fittings.

Rust-Oleum—Washington

THE RUST-OLEUM CORPORATION, 2799 Oakton St., Evanston, Ill., manufacturers of rust preventives, announce the appointment of the CLARK-FONTANA PAINT COMPANY, 1455 "P" Street, S.W., WASHINGTON, D. C., as industrial distributor for their products.

RODA — High grade gas, by-product, steam and household stoker coal from Wise County, Virginia, on the Interstate Railroad.

DENDRON — High grade gas, by-product, steam and domestic coal from Wise County, Va., on the Interstate Railroad.

STONEGA — High grade, high volatile steam and by-product coal from Wise County, Va., on the Interstate Railroad.

GLENBROOK — The Premium Kentucky High Splint unmatched for domestic use. Produced in Harlan County, Kentucky, on the L. & N. Railroad.

COKE — Roda and Stonega from Wise County, Va.

CRITERION COAL — High grade gas, by-product, steam and domestic coal—Pittsburgh seam from Irwin Basin, Westmoreland County, Pennsylvania, on the Penna. Railroad.

HAMPTON COAL — High volatile domestic, steam and by-product coal from Boone and Logan Counties, W. Va., on the Chesapeake & Ohio Ry.

CROZER — Genuine Pocahontas from McDowell County, W. Va., on the Norfolk & Western Railway.

LYNCO — High fusion coking coal for by-product, industrial stoker and pulverizer use from Wyoming Co., W. Va., on the Virginian Ry.

ANTHRACITE

Hazel Brook—*Premium Lehigh*
Raven Run—*Premium Mahanoy*
Cross Creek—*First Grade Lehigh*

Our engineering service, available upon application, and long and varied experience is your assurance of the Right Coal — Properly Applied.

General Coal Company

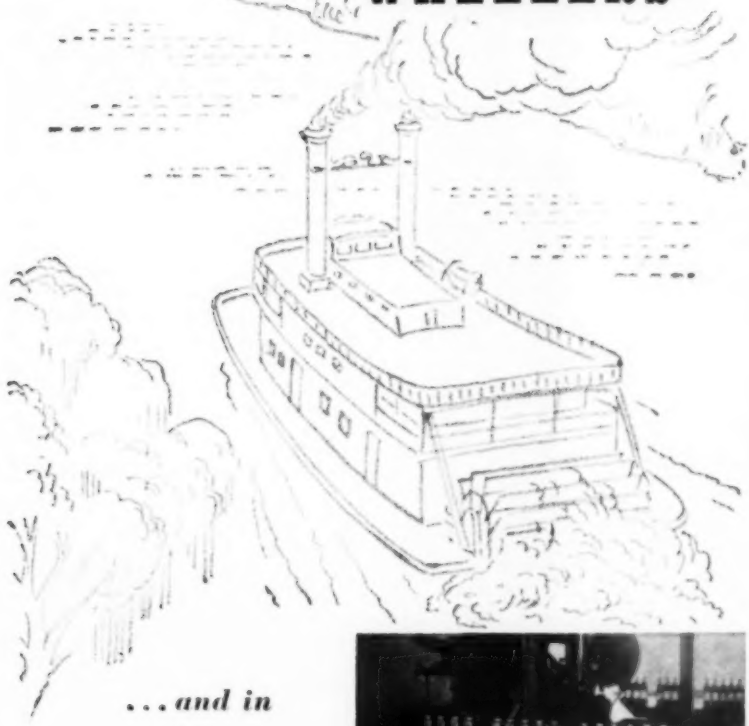
123 SOUTH BROAD STREET PHILADELPHIA 9, PA.

CABLE ADDRESS, GENCO

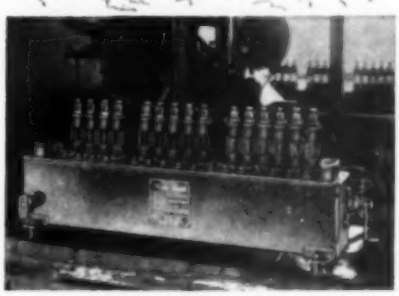
Branches:

BLUEFIELD, W. VA. BUFFALO CHARLOTTE, N. C. CINCINNATI
NEW YORK NORFOLK PITTSBURGH

On Mississippi "STERN-WHEELERS"



. . . and in Modern Industrial Plants



The picturesque packets that ply the Mississippi . . . like steam or Diesel powered boats on rivers, lakes and seas throughout the world . . . depend on Manzel Force Feed Lubrication for protection of vital wearing parts. Manzel Lubricators automatically supply just enough oil to each point, insuring years of trouble-free service from engines, presses, and other heavy machinery. Insist on Manzel Lubrication in your new equipment — or install it on your old. For further information write Manzel, 318 Babcock Street, Buffalo 10, N. Y.

Manzel **FORCE FEED LUBRICATION**

A DIVISION OF FRONTIER INDUSTRIES, INC.

news (continued)

Most Powerful Motors

Four motors—two the largest ever built—for installation in the U. S. Air Force's transonic and supersonic wind tunnels at the Arnold Engineering Development Center at TULLAHOMA, TENN., are nearing completion at the East Pittsburgh plant of WESTINGHOUSE ELECTRIC CORPORATION.

The motors—two rated at 83,000 horsepower each and two rated at 25,000 horsepower each—will be installed in tandem fashion. The 83,000-horsepower motors will stand 21½ feet high and weigh 225 tons. Their 122-ton rotors will turn at 600 revolutions per minute.

In addition to the 216,000-horsepower four-motor drive, the rotating machine will have five compressors, now under construction at the Westinghouse plant in Sunnyvale, Calif.

The blades for the compressor measure two feet across the face, are six feet long, and will be mounted on a spindle 18 feet in diameter. Weighing almost two-thirds of a ton each, the blades will be solid forgings.

The first of the two 83,000-horsepower motors has been successfully tested at East Pittsburgh and is ready for shipment. Although the machine has the highest stored energy of any rotating mass ever built, it can be brought to a halt in about three minutes by using its wound-rotor motors as brakes, the energy being dissipated in liquid rheostats.

Atomic Eqpt.—Westinghouse

Atomic power as a commercial business is a step nearer reality with the announcement by WESTINGHOUSE ELECTRIC CORPORATION of its plans for a new, multi-million dollar plant to produce atomic equipment. The plant will be operated by a newly formed Atomic Equipment Department.

The new facility, believed to be the first major private enterprise of its kind anywhere, will be located near Pittsburgh. At this plant the Company will engineer, manufacture and sell products that have been developed for atomic power plants.

Golden-Anderson Expands

GOLDEN-ANDERSON VALVE SPECIALTY COMPANY, Pittsburgh, Pa., has acquired the shop and equipment of Imperial Machine Works, Inc., to increase production facilities. This new addition contains over 20,000 square feet of usable floor space.

Booth of Buffalo Forge Dies

CHARLES ARTHUR BOOTH, Executive Vice President of BUFFALO FORGE COMPANY, Buffalo, N. Y., died recently after a short illness. Mr. Booth had been with the company since 1909. He was a past president of the National Association of Fan Manufacturers, and was active in the American Society of Mechanical Engineers and the American Society of Heating and Ventilating Engineers.

A&A Supply Company Host to Allen-Bradley Sls. Meeting

THE A & A SUPPLY COMPANY, Box 1516, Albuquerque, N. M., and ABILENE, TEXAS, was recently host to an ALLEN-BRADLEY CO. distributors' meeting in Albuquerque. L. C. WATSON, sales manager of the Allen-Bradley Co., and representatives of EL PASO SAW & BELTING SUPPLY CO., EL PASO; SERVICE & SUPPLY, AMARILLO; J. KORBER & Co., Albuquerque, N. M.; and the A & A Supply Company attended.

W. O. ANSLEY is manager of the A & A Supply Company, Abilene, Texas. The company represents several leading motor, generator, control, and distribution accounts in New Mexico, Arizona, and parts of Texas and Colorado.

LOOK FOR THESE FEATURES IN STEEL GRATING

1. STRENGTH
2. SAFETY
3. LOW UPKEEP
4. LONG LIFE
5. SELF-CLEANING

BLAW-KNOX ELECTROFORGED® GRATING gives you all five

Regardless of what features are most desirable for your steel grating, you get what you want when you specify "Blaw-Knox." Its electroforged, one-piece construction provides exceptional *strength*, and the twisted cross bars give you a *safe* walking surface. The clean-cut openings—without angle irons—make it *self-cleaning* and easy to paint . . . contribute to *low upkeep*. Blaw-Knox Steel Grating has *long life* because there are no holes or crevices to trap moisture and encourage corrosion. Get the complete story on Blaw-Knox Grating and Stair Treads—write for Bulletin 2365 today.

We factory-fit Blaw-Knox Grating to your dimensions for easy installation.

Grating Department
Blaw-Knox Equipment Division
BLAW-KNOX COMPANY
2034 Farmers Bank Bldg., Pittsburgh 22, Pa.

BLAW-KNOX ELECTROFORGED® STEEL GRATING

Pioneer Pump—Texas, La.

Appointment of THOMAS F. SEARS COMPANY, 4085 Valerie, BELLAIRE, TEXAS, as exclusive representative to handle sales and engineering service of the complete line of Pioneer and Rollway centrifugal and positive displacement pumps for the states of TEXAS and LOUISIANA, has been announced by PIONEER PUMP, DIVISION OF DETROIT HARVESTER CO., Detroit, Mich.

Sears, who heads the organization, previously has been associated with Allis-Chalmers Mfg. Co. and with the Kaylo Div. of Owens-Illinois Glass Co. as Regional Supervisor of Sales over their St. Louis, Oklahoma City and Houston, Texas, offices.

Welding Exposition—Houston

A four-day, all-welding exposition sponsored by the AMERICAN WELDING SOCIETY will be held June 16-19, 1953, at The Shamrock Hotel, HOUSTON, TEXAS, in conjunction with the Society's Spring Technical Meeting. This exposition will present demonstrations of the latest technical developments in the field of welding and its allied processes.

Exhibits will be comprised of manufacturers who sell products for welded fabrication, weldments, welding processing, gas cutting, brazing, finishing, tooling, gauging, testing, stress relieving, X-raying, servicing and handling.

Courtaulds, Inc., Alabama

The formal opening of the modern rayon plant at LEMOYNE, MOBILE COUNTY, ALABAMA, was announced recently by Courtaulds, Inc., 600 Fifth Ave., New York, N. Y. The LeMoyne plant is owned and operated by Courtaulds (Alabama) Inc. and the rayon staple produced will be sold to the domestic industry.

The new plant is located on a 550-acre site twenty miles north of Mobile. It has a capacity of more than 50,000,000 pounds annually of viscose rayon staple fiber and embodies the latest technological advances in viscose manufacturing. The H. K. FERGUSON COMPANY of Cleveland, Ohio, were contractors for the project.

Viking Pump Company Opens Atlanta Service Operation

VIKING PUMP COMPANY, Cedar Falls, Iowa, has opened a new warehouse and repair service operation at 1214 Spring St., N. W., ATLANTA, GEORGIA. C. W. DOWNING, head of the Atlanta Office, is manager of the new service, which covers the states of GEORGIA, ALABAMA, eastern TENNESSEE, the CAROLINAS and FLORIDA. A complete stock of the company's industrial and general application pumps is carried, in addition to complete service facilities.

In 1952, a similar warehouse and service center was established at 2175 W. Commerce, DALLAS, TEXAS, with O. W. PHILLIPS as manager.

International Glass Purchases Perrault at Newport, Ark.

INTERNATIONAL GLASS CORP., 8715 West Third St., Los Angeles, California, has purchased all the plant facilities and equipment of the Perrault Glass Fiber Corp. in NEWPORT, ARKANSAS.

The plant produces glass fiber and glass fiber pipe wrap, outer wrapping for pipe, roofing material, battery retainers, battery separators, and irrigation canal liner. Engineering improvements are being made to produce additional products.

Luria Completes Geigy Addition at Leland, Miss.

A 12,000-square-foot addition to the LELAND, MISS. factory of GEIGY COMPANY, INC., manufacturer of pharmaceuticals, insecticides, agricultural chemicals and dyestuffs, has just been constructed by the LURIA ENGINEERING COMPANY.

The addition is a standardized one-story, steel-frame structure that is 100 feet long. It has three clear-span bays of 40 feet each. It is 16 feet high to the eaves and has corrugated steel sides and roof.

Westinghouse—TVA Order

Approximately $750,000 worth of mechanical draft equipment has been ordered by the Tennessee Valley Authority from WESTINGHOUSE ELECTRIC CORPORATION'S STURTEVANT DIVISION.

The heavy equipment, designed for use with new boilers being erected at the TVA's Kingston, Tenn., station will include eight turbovane forced-draft fans, eight multivane induced-draft fans, eight 1,750 hp motors, and eight 700 hp motors.

Okadee
"THE PERFECT SEAL"
WRING FIT

No magic... No magnetism... lapped wring fit of every Okadee Valve disc and seat must pass this test of a perfect sealing surface. (unretouched photo)

...Here's What it Means to You in Terms of Valve Service

Flat mating surfaces within .000005", or less, of every set of Okadee valve discs and seats mean absolute shut-off of any material from ammonia gas to asphalt.

How long does this seal last in service? We honestly don't know. Tests under working conditions with propane were stopped after 269,000 operating cycles when no wear or seal failure could be detected. And Okadee valves do not have to be babied in service on corrosive or abrasive materials . . . Thousands of boilers have had Okadee blow-down valves in continuous, trouble-free service for fifteen years or more. If Okadee size-pressure-temperature ranges include your valve applications, Okadee installation will end your problems of valve performance once and for all.

Okadee valves are available in single-disc (one direction) and double-disc (two directions) types; screwed or flanged; ½" to 6" in standard A.S.A. dimensions; steel or semi-steel bodies (other materials to order); stainless steel or stellite seat facings; levers, rack-and-lever, worm-gear, hydraulic, pneumatic, automatic on-off control.

Write for Bulletin 332-H today!

OKd. Okadee COMPANY
332 South Michigan Avenue • Chicago 4, Illinois

Lawrence Pumps, Inc.

Lawrence Machine and Pump Corporation, 371 Market St., Lawrence, Mass., announces that the name of the company has been changed to LAWRENCE PUMPS, INC. Plant facilities have been expanded.

D. B. GOOCH ASSOCIATES, INC., 8008 First Ave., North, BIRMINGHAM 6, ALABAMA, are district representatives.

Insul-Mastic—Birmingham

THE INSUL-MASTIC CORPORATION OF AMERICA, 1141 Oliver Bldg., Pittsburgh 22, Pa., has recently licensed NORTH BROTHERS, Box 986, BIRMINGHAM, ALABAMA, to sell and apply its industrial coatings, which are used mainly to prevent corrosion to metal equipment.

A-C Board Names Reeder

Election of REX REEDER, executive vice president, Marine National Exchange Bank, Milwaukee, to the board of directors, ALLIS-CHALMERS MFG. CO., has been announced by W. A. ROBERTS, president of the firm.

Bornemann Represents H. H. Buggie, Miss.-La.

WALTER E. BORNEMANN, manufacturers' representative, 4719 Cartier Ave., NEW ORLEANS, LA., has been appointed MISSISSIPPI-LOUISIANA representative for H. H. BUGGIE & COMPANY, Toledo, Ohio, manufacturer of connectors, cable assemblies and component parts for the communications and electronics industries.

A-C Service Repr., Atlanta

The service section of ALLIS-CHALMERS general machinery division has announced the appointment of ROBERT R. WHITEHEAD as service representative for the company's Southeast Region with headquarters in ATLANTA, GEORGIA.

Canton Stoker—W. Va.

CANTON STOKER CORPORATION, Canton, Ohio, specialists in coal firing, handling and control equipment, announce that in WEST VIRGINIA, LOYD A. WILDMAN of PYRO-NEERS, INC., P.O. Box 563, Charleston 22, will represent the stoker firm.

Commercial Solvents—La.

THE COMMERCIAL SOLVENTS CORPORATION, producer of methanol, ammonia and nitrogen fertilizers, awarded a contract to the LURIA ENGINEERING COMPANY for a 16,000 sq ft plant in STERLINGTON, LOUISIANA.

The one-story building, scheduled for completion in March, will be used for the manufacture of ammonium nitrate.

Walter Kidde Names Ferguson

A. KINGSLEY FERGUSON has been appointed vice president in charge of industrial engineering for WALTER KIDDE CONSTRUCTORS, INC., engineers and builders with offices in New York and HOUSTON. Mr. Ferguson joined the Kidde organization in 1952 as assistant to the president.

Gladden—Kansas City, Mo.

GLADDEN PRODUCTS CORP. announces that a new factory owned distributorship has been set up at 10 West 19th Street, KANSAS CITY 8, MISSOURI.

This distributorship will handle the sales and service for the full line of Gladden engines and other products. MR. WALTER FULTON has been appointed branch manager.

Efficient
FOUNDRY DUST CONTROL
Well engineered and effective dust control is necessary to efficient operation.
The photo shows a foundry shake-out room in which dust is effectively suppressed and removed at the source by virtue of collection both above and below the shake-out.
There is no simple "formula" for the selection of dust control equipment. For guaranteed results—just one contract, one responsibility for a complete, ready-to-operate system, consult experts. If you need a new system . . . or more capacity in an existing one, call on Kirk & Blum.
KIRK AND BLUM
DUST CONTROL SYSTEMS
3198 Forrer St., Cincinnati 9, Ohio

news (continued)

Dr. R. C. Ulmer Joins C-E

DR. R. C. ULMER, well known in the power field as a feedwater specialist and for the last seven years technical director of E. F. DREW & Co., has joined the Engineering Department of COMBUSTION ENGINEERING-SUPERHEATER, INC., New York, where he will be engaged in development work.

Plant Electricians Note

To help plant men become better acquainted with the electrical equipment in their charge, SP&I is publishing a series of Question and Answer articles on Electrical Equipment Fundamentals. See Page 80.

Books for the Plant Engineer

Control of Electric Motors

BY PAISLEY B. HARWOOD

PUBLISHED BY JOHN WILEY & SONS, INC.
440 Fourth Ave., New York 16, N. Y.
535 pages
Price, $7.50

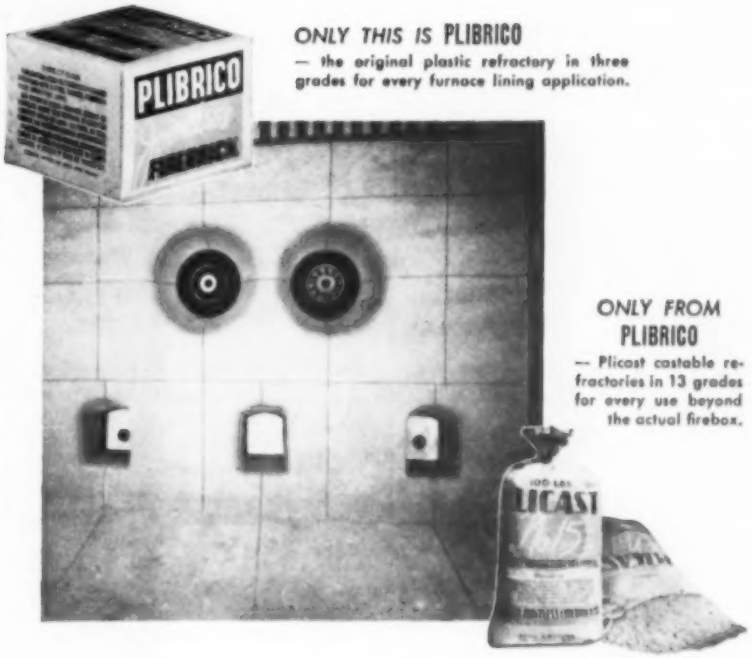
This third edition is arranged entirely by motor types. Describing the design, construction, and application of controllers for electric motors, it begins with a general discussion of wiring diagrams, construction details, and pilot devices as applied to all kinds of motor control. One section covers d-c motors and motor control, and another a-c motors and motor control. This volume is brought up to date with new material on devices and circuits.

Commercial and Industrial Refrigeration

BY C. WESLEY NELSON

PUBLISHED BY MCGRAW-HILL BOOK COMPANY
330 W. 42nd St., New York 36, N. Y.
467 pages
Price, $7.00

This volume is a text for those with elementary physics backgrounds who are interested in practical studies and practice. It deals with elementary theory of refrigeration; classification and description of equipment; and installation and servicing. The theory and principles presented are general enough to apply to more common types of refrigeration, while the descriptive matter becomes more particular.



ONLY THIS IS PLIBRICO
— the original plastic refractory in three grades for every furnace lining application.

ONLY FROM PLIBRICO
— Plicast castable refractories in 13 grades for every use beyond the actual firebox.

Not just better refractory products
—BETTER SERVICE, too!

The hundreds who *always* come to Plibrico for *all* refractory needs have a very solid reason for doing just that: They have found that the name, Plibrico, stands for a combination of products, methods, and services that never fail to deliver better end results at lower cost.

In Plibrico they find, not just one, but all the answers to their needs:

THE RIGHT PRODUCTS: Plibrico Jointless Firebrick in grades for every firebox application; Plicast castable refractory in grades for every use beyond the firebox.

ENGINEERING KNOWLEDGE accumulated in dealing with every conceivable furnace design and boiler setting problem.

CONSTRUCTION METHODS that put a better product into still better practice: Plibrico Flexo-Anchors that prevent bulging; Taperlok supports that provide sectionalized construction — air cooling when required.

All this is available in *every* industrial trading center through the nation-wide Plibrico sales and service set-up. Your nearby Plibrico Sales & Service organization is ready to show you the unapproached combination of products, engineering, construction, and installation that *IS* Plibrico!

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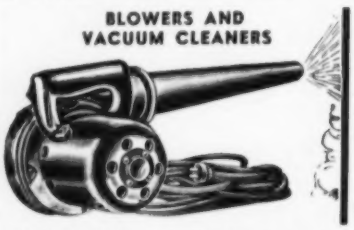
PLIBRICO SALES & SERVICE IN PRINCIPAL CITIES
REFRACTORY PRODUCTS • ENGINEERING • CONSTRUCTION

MARTINDALE

COMMSTONE HOLDERS

Hold Commstones rigid and true for concentric resurfacing of commutators and slip rings while running at normal speeds in their own bearings. Interchangeable boxes 1", 2" and 3" wide handle grinding jobs up to 4¼" wide.

BLOWERS AND VACUUM CLEANERS



MARTINDALE COMMSTONES AND COMMUTATOR GRINDING TOOLS

MICA UNDERCUTTERS FOR SLOTTING COMMUTATORS

Nine Motor Driven Types

MARTINDALE PROTECTIVE MASKS

PLACE HEAD BAND WELL UP AROUND HEAD TO KEEP FROM SLIPPING DOWN
PRESS NOSE TABS IN CLOSE AGAINST FACE TO HOLD PAD AGAINST THE NOSTRILS
PRESS EDGES OF FACE PLATE DOWN TO FIT FACE SNUGLY

Weigh less than ½ ounce

Write for New 64-page Catalog No. 29 describing these and many other products for Industrial Maintenance, Safety and Production.

MARTINDALE ELECTRIC CO.

1334 Hird Ave. Cleveland 7, Ohio

Equipment . . Supplies . . Methods (Starts on Page 8)

Free additional information is available to readers of SP&I. Circle the item code number on one of the reader service post cards provided on pages 17-18.

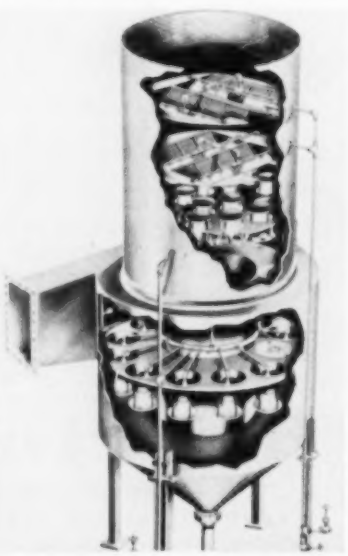
Controlling Stack Dust

X-7 JOHNSON-MARCH CORPORATION, Philadelphia, Pa., has introduced a new system for controlling stack dust.

The system combines six different principles of dust precipitation, and is said to be capable of removing large volumes of dust from stack gas. It is adaptable to control of dust from rotary dryers, cyclones, kilns, roasters, mixers and pulverizer exhausts; and from the stacks of asphalt plants, chemical plants, and similar industrial operations.

Average draft loss of the scrubber is about 2 in. of water column. The unit is built in sizes for capacities from 1,500 cfm to 48,000 cfm. Dust removed from the air is reduced to a watery sludge which can be discharged into a tank or pond for easy removal of solids. A recirculation system can be used where water supply is a problem. System requires approximately 2 gallons of water per minute at 40 to 50 psi for each 1,000 cu ft of gas per minute.

Multiple-action scrubber design by Johnson-March Corporation claimed to have low water demand.



Support Hanger

X-8 GRINNELL COMPANY, INC., 260 West Exchange St., Providence 1, R. I., has developed support hangers which are said to provide constant support that is mathematically suited for all positions of travel for high temperature process and steam piping.

An exclusive feature of design permits 10 per cent increase or 10 per cent decrease in load by field adjustment of a single bolt, without impairing constancy.

This new design results in hangers which are smaller in size for the loads carried. Less head room is required and hangers can be bolted directly to the building structure and the frames are drilled for either single or double rod suspension.

These Model R. Constant support hangers are non-resonant and in combination with the use of anti-friction needle bearings, friction has been reduced to a minimum. The new design provides favorably small ratios between spring force and the supported load ranging from 1.15 to 1 minimum

Three sizes by Grinnell provide maximum travels of 4, 8, and 12 in., taking care of all loads from 48 to 9,304 lb.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

and 4 to 1 maximum, thereby minimizing bearing stress and prolonging the life of the hanger.

Each hanger is individually calibrated before shipment to support the exact load specified. A load scale is provided so that field adjustments of at least plus or minus 10 per cent may be made by turning the single adjusting bolt. Wherever the adjustment is set the Model R gives a load deflection curve that is a straight horizontal line.

Air-Cooled, Gasoline-Powered Generating Plant

X-9

D. W. Onan & Sons, Inc., Minneapolis, Minn., have developed an advanced type air-cooled, gasoline-powered electric generating plant.

Designated the "CW" model, it is now being produced in 5,000-watt and 10,000-watt capacities. Many features usually reserved for heavy-duty Diesel design have been incorporated in these new gasoline-powered plants.

The plants combine engineering and design principles that are said to result in low initial cost per kilowatt of power; lower operating cost; increased durability, plus high output; substantial reduction in size and weight per kilowatt; simplicity of installation, operation and maintenance; and maximum safety.

The "CW" models were developed to better meet the demand for independent electric power plants and for standby emergency electricity.

Onan's vacuum cooling system employs a blower which draws cold air through the generator and over the engine, and at the same time discharges heated air out of an 8 x 12 in. side vent.

DIXISTEEL TRADE MARK NOW OFFERS

ONE OF THE SOUTH'S LARGEST FACILITIES FOR

HOT-DIP GALVANIZING

New Tank Size
4 FT. WIDE
6 FT. DEEP
25 FT. LONG

Double-dipping affords accommodations for pieces up to 45 feet long.

- CASTINGS
- FABRICATED PARTS
- EXPANDED METAL
- PIPE
- TANKS
- STRIP
- BARS
- PLATES

Manufacturers, fabricators, users of steel products: let us give you complete information about these new facilities which have greatly increased our capacity, provided for a more uniform and cleaner job, and made it possible to accommodate items of larger size.

Let us tell you how little it costs to improve the appearance of your steel products and give them years of added life.

Write, wire or phone us today for quotations on this superior service. Please give details about materials, including all dimensions.

If it's exposed to rust—hot-dip galvanize it!

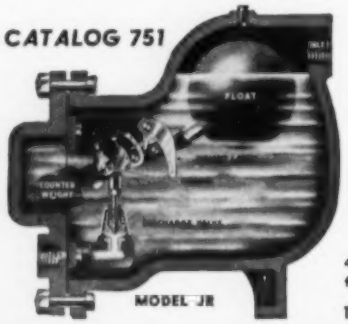
FABRICATING DIVISION
Atlantic Steel Company
ATLANTA, GEORGIA • EMERSON 3441

BOILER TUBE CO. OF AMERICA
McKEES ROCKS, PA.
(Pittsburgh District)
PITTSBURGH • CHICAGO • FRED S. RENAULD & CO., LOS ANGELES

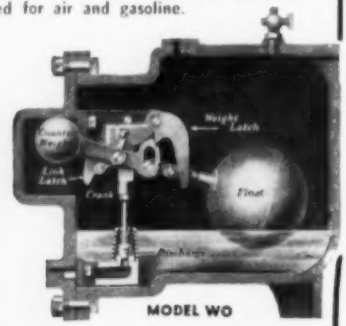
NICHOLSON W. O. TRAPS
Cannot Leak Live Steam

Even though re-evaporation completely dries up its body, a Nicholson weight-operated trap will not leak live steam. These units do not depend on buoyancy of float to raise valve. Other features: large orifices keep valve clean; non-wire drawing; rugged for unavoidable abuse; not easily affected by dirt, pulsation; of stainless steel where it counts. Widely used for steam purifiers, super-heated steam lines, headers, separators, heaters, dry kilns, pipe coils, turbine throttle valve drips, stop and check valves, etc. Nicholson weight operated traps also used for air and gasoline.

CATALOG 751



MODEL JR



MODEL WO

4 TYPES—press. to 200, 500, 650, 1500 lbs.; for every large-capacity, heavy-duty use.

175 Oregon St., Wilkes-Barre, Pa.

W. H. NICHOLSON & CO.
TRAPS · VALVES · FLOATS

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Vertical Sewage Pump

X-10

THE DEMING COMPANY, Salem, Ohio, has announced a new line of vertical sewage pumps, which have fluid ends in 2", 3" and 4" sizes designed to handle solids 1½", 2" and 3" in diameter, respectively. Capacities range from 50 to 1000 gpm against heads up to 60 ft.

Units can be furnished with electric motors up to 20 hp or equipped for steam turbine drive. Motor mounting is designed with standard NEMA type "C" flange or, at extra cost, an adapter flange can be furnished for other types of motor mounting brackets.

Among the noteworthy features of these pumps is the thrust bearing assembly. The coupling in the lower half of the unit fits accurately into the bore of a large capacity, angular contact radial and thrust ball bearing.

This thrust bearing assembly is mounted on the end of the pump shaft directly under the adjusting nut. The ball bearing is grease lubricated and sealed against outside dirt.

The guide bearing assembly is an accurately machined cast iron bearing housing with a full bearing flange between the column pipe flanges.

Impeller is an enclosed, 2-vane, non-clog type, adjustable vertically with shaft. Impeller is mounted on shaft with locking taper, woodruff key and safety lock nut. Wearing rings snub any shock on the impeller and prolong life of pump.

new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

Illuminator Design for Water Level Gage Readings

X-11 YARNALL-WARING COMPANY, Philadelphia 18, Pa., is offering a new illuminator for use in high pressure boiler plants, for greater visibility of flat glass water level gage readings.

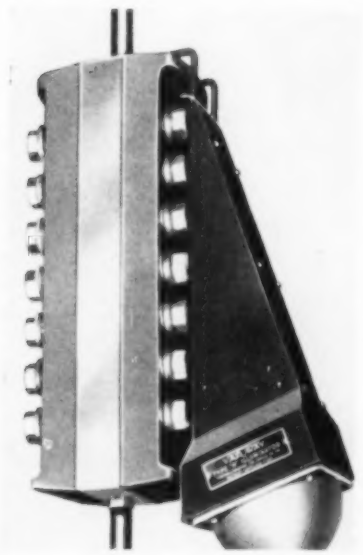
The greenish blue color of the light emitted from this lamp makes it more visible. The overall effect is to produce a brilliant source of illumination which makes the meniscus at the water level "shine like a star" over the entire length of visibility of the gage.

With the new illuminators, water levels have been successfully transmitted a distance up to 125 ft. With the use of a light shield at the gage and suitable ducts, this distance can be appreciably increased.

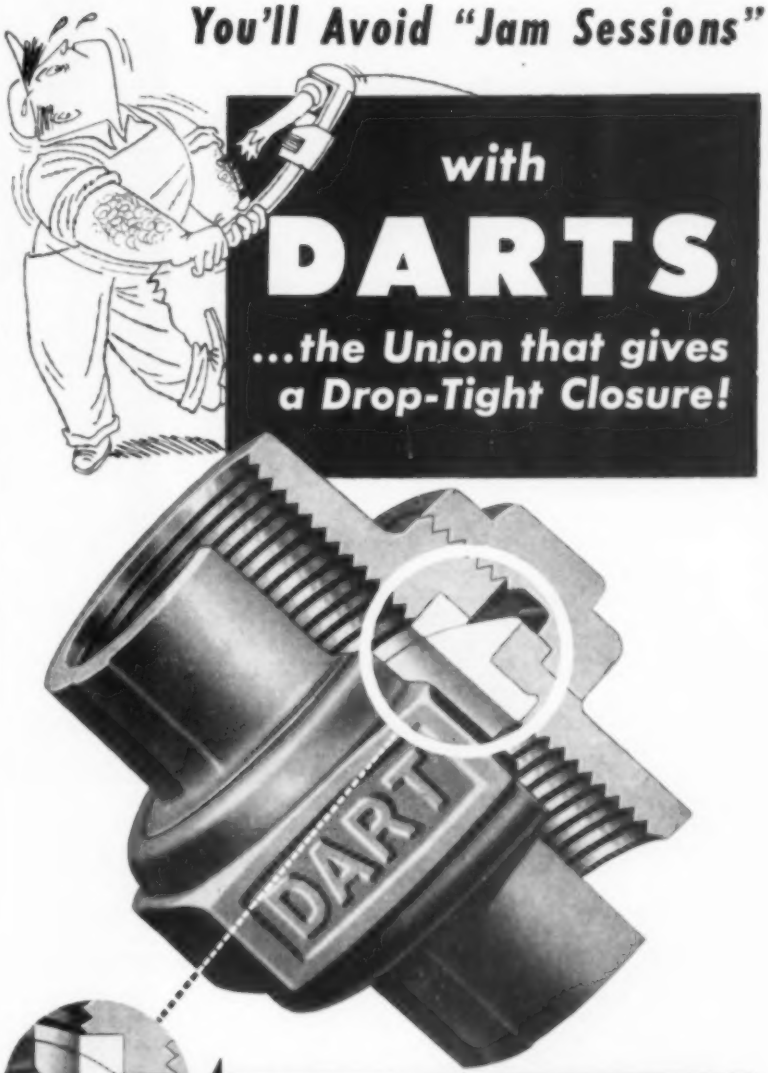
The mercury vapor rays also have the ability to penetrate foreign deposits on the mica. This results in a longer gage service life since very often in the past poor visibiiity has been responsible for repair of the gage. The illuminator is also less affected by extraneous light that often impairs water gage visibility.

The complete unit consists of the illuminator, plus a small ballast. The ballast can be conveniently located and plugged into a standard 120 volt electrical system.

Yarnall-Waring design uses a 100 watt sealed-in beam mercury vapor lamp as its source of light. Lamp produces about twice the amount of light for the same power input as compared with an incandescent light.



You'll Avoid "Jam Sessions"



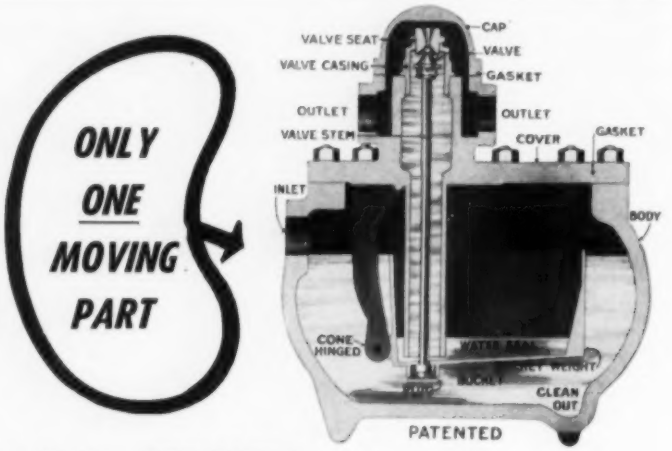
DART UNIONS don't get tight, stay tight because of an ordinary "jammed" joint. Their tightness comes from a precision-ground, bronze-to-bronze ball joint that comes apart readily and remakes repeatedly — as tight as when new.

Both seats are non-corrosive bronze for top protection against pitting and corrosion. Nuts and both ends are high test, air refined malleable iron — practically indestructible in use or abuse.

Remember, the *extra* work life of a Dart is money in your pocket! Darts can be installed and reinstalled, time after time, with absolute assurance of tightness.

DART UNION COMPANY
Providence 5, Rhode Island
The Fairbanks Co. — Distributors
Boston New York Pittsburgh

DART UNIONS



in a Squires STEAM TRAP

Over the long pull, Squires Steam Traps are the LEAST EXPENSIVE to own and operate. These are the reasons why: (1) There is only ONE moving part—the bucket hinge. (2) The larger capacity in both orifice and bucket mean fewer discharges, less wear. (3) You don't have to break main line connections to get at the valve and seat.

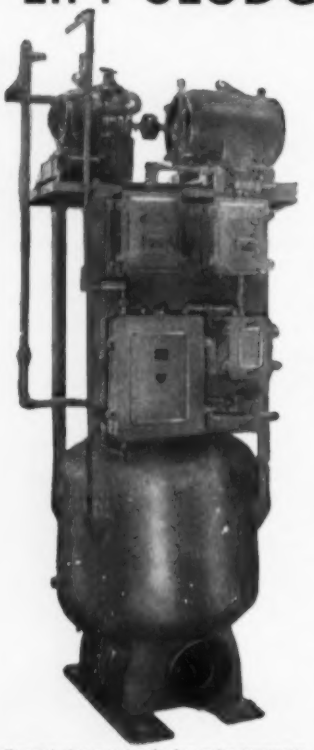
You can't beat Squires for economy of operation. It is one steam trap you can INSTALL and FORGET. Write today for complete details. Ask for Catalog No. 100. Write us concerning traps for testing purposes.

IN MANY INDUSTRIES FOR OVER 40 YEARS . . .
DEPENDABLE SQUIRES TRAPS ARE IN DAILY USE

Steel — Pulp & Paper — Meat Packing — Public Utilities — Steam Ship — Distilling — Food Processing — Textile — Oil — Chemical — and many others.

THE C. E. SQUIRES COMPANY
Over 50 Years of Dependability
18532 SYRACUSE AVE. — DEPT. B-1 — CLEVELAND 10, OHIO

LIFT SLUDGE AND SEWAGE



Compact ejector system having motor compressor assembly and all controls in one "packaged" unit.

. . Unfailingly . . With Rugged, Dependable

BLACKBURN-SMITH PNEUMATIC SEWAGE EJECTORS

Obviate complex piping for air and water. Eliminate clogging of screens, impellers, and shredders.
30 to 500 GPM in both single and twin units against high discharge heads.

Exclusive Modern Features

Over 50 years service has proved the worth of Blackburn-Smith Ejectors. Yet our today's product is full of exclusive modern features such as:

1. Float and electrical float switch controls.
2. Float and pneumatically controlled snap action valve.
3. Electrode controls.

Any one of the above, with or without Air Receivers. Get Catalog S.

REPRESENTATIVES WANTED. ADDRESS:

BLACKBURN-SMITH MFG. CO.
93 River St., Hoboken, N. J.

Cylinder-Operated Quick-Acting Valve

X-12 EVERLASTING VALVE COMPANY, 49 Fisk St., Jersey City 5, N. J., has developed a new design of cylinder-operated quick-acting valves.

The valves may be actuated by air or other fluid, can be regulated for operation at any speed, and also remote controlled electrically or manually. The design permits automatic cycle operation and multiple operation by one man, and power control eliminates operator fatigue. These valves have straight-through flow and drop tight seal.

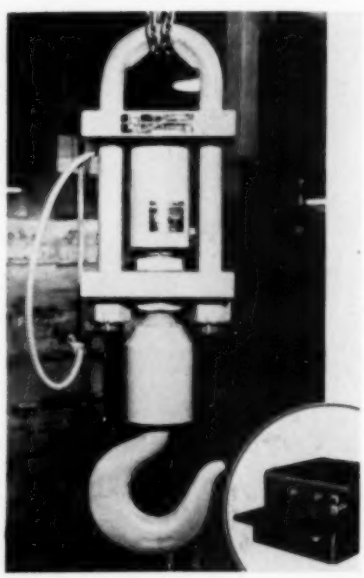
High Temperature Insulating Blocks

X-13 THE EAGLE-PICHER COMPANY, 900 American Bldg., Cincinnati 1, Ohio, has announced that a completely new process for producing industrial high temperature insulating blocks is now under way.

Electronic Crane Scale

X-14 STREETER-AMET COMPANY, 4101 Ravenswood Ave., Chicago 13, Ill., announces the company's Ametron Electronic Crane Scale for the remote recording of weight.

In industrial plants, mines and railway shops, heavy weighing is accomplished speedily and accurately. Remote recording of the weight is printed on tape, ticket or cards. Reduced installation and operating costs, and safety protection are featured.



new equipment (continued)

For more data circle item code number on the postage free post card—p. 17

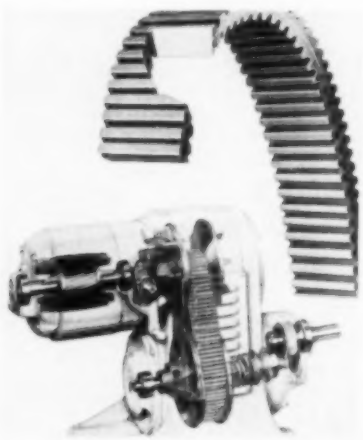
Double-Ribbed V-Belt in Varidrive Motor Design

X-15 U. S. Electrical Motors, Inc., Box 2058, Los Angeles 54, Calif., announces the development of an improved, double-ribbed V-belt, which is said to reduce internal friction and permit greater flexibility.

The new design makes it possible to combine greater speeds and smaller diameters, which in turn permits design changes to develop greater horsepower within a smaller space, producing maximum motor compactness. The outer periphery is relieved of destructive tensile strains; the inner periphery is free from excess compression. Belt bends easily.

Varibelts are constructed of synthetic rubber, built up in layers, then cured under pressure in precision molds. Use of synthetic fiber instead of cotton cords adds 25 per cent more strength and permits employment of smaller cords to reduce heat. The belt is said to have highest resistance to heat, oil and grease, and is protected from drippings by complete enclosure.

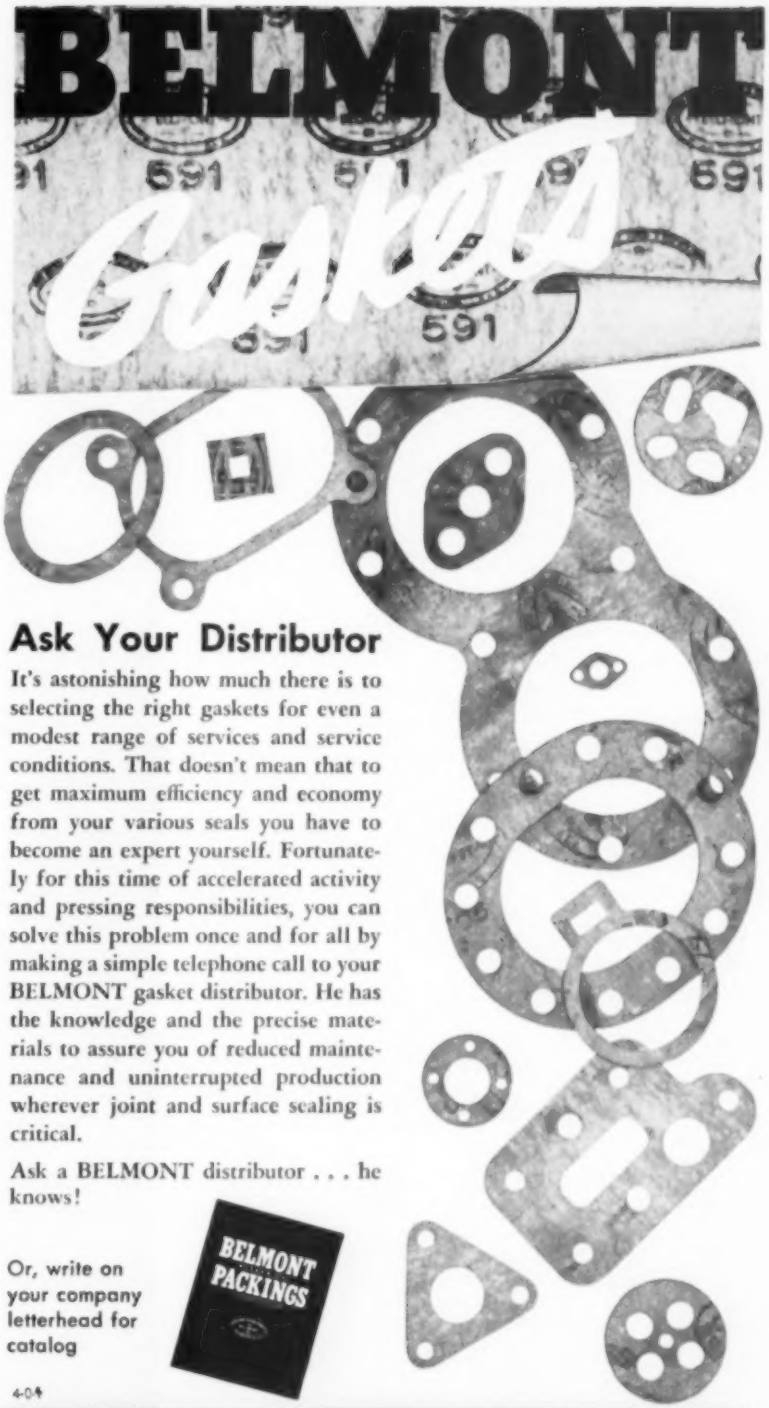
U. S. Double-Ribbed Varibelt showing installation in Varidrive motor.



Differential Pressure Measuring Element

X-16 Taylor Instrument Companies, 95 Ames Street, Rochester 1, N. Y., announce the Transaire, a differential pressure transmitter for flow, liquid level and specific gravity applications.

The new instrument is the company's answer to the problem of close-coupled fluid flow measurement, liquid



Ask Your Distributor

It's astonishing how much there is to selecting the right gaskets for even a modest range of services and service conditions. That doesn't mean that to get maximum efficiency and economy from your various seals you have to become an expert yourself. Fortunately for this time of accelerated activity and pressing responsibilities, you can solve this problem once and for all by making a simple telephone call to your BELMONT gasket distributor. He has the knowledge and the precise materials to assure you of reduced maintenance and uninterrupted production wherever joint and surface sealing is critical.

Ask a BELMONT distributor . . . he knows!

Or, write on your company letterhead for catalog

4-04

More Accurate Level Reading of LOW TEMPERATURE LIQUIDS . . .

JERGUSON

Large Chamber

NON-FROSTING* GAGES

YOU get the highest possible accuracy of reading on low temperature, low boiling point liquids with the patented Jerguson Non-Frosting Gage in the New Large Chamber model . . . because it insures less turbulence at the meniscus, and clear vision at the vision slot.

This new Jerguson model has 6 times larger area at the meniscus than the standard gage, so that there is a marked reduction in turbulence with light gaseous fluids that tend to boil or surge. Moreover, the problem of frosting encountered with these liquids has been eliminated by a patented frost preventing unit extending from the gage glass. This special transparent unit projects beyond the cover bolts and prevents frost from building up over the vision slot.

Here's a dual feature gage that assures greatly increased accuracy of reading for the process industries. If you have a problem with light gaseous fluids, or with gage frosting, it will pay you to investigate the new Jerguson Large Chamber Non-Frosting Gage . . . reflex or transparent.

Jerguson Large Chamber Gage, Transparent Type, with the patented Non-Frosting Gage Glass Extension. Write for literature on this gage, and on other non-frosting Jerguson models.

*Patented

JERGUSON

Gages and Valves for the Observation of Liquids and Levels

JERGUSON GAGE & VALVE COMPANY

100 Fellsway, Somerville 45, Mass.

Offices in Major Cities

Jerguson Tress Gage & Valve Co., Ltd., London, Eng.

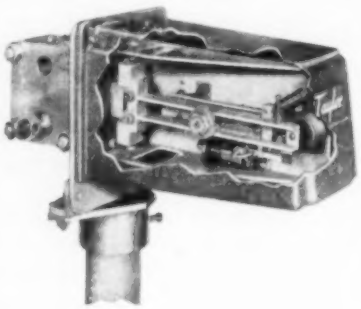
Pétrole Service, Paris, France

level or any other installation requiring differential pressure measurement and transmission. It is a force-balance transmitter, designed to convert differential pressure into an equivalent 3 to 15 psi output. It can be used to measure flow of liquid, steam or gas; liquid level or specific gravity.

Important design features provide for simplified installation, easy maintenance, simple adjustment, and a built-in damping device which gives true average damping with pneumatic stability.

Force balance construction contributes to the transmitter's smooth acting characteristics and dependable service. It is available with carbon steel or stainless steel bodies, and stainless internal parts as standard.

Two basic units in the Taylor Transaire Transmitter—1. Primary—senses differential pressure. Inner housing of two-part unit, shaped to contour of diaphragm to permit full-over-range protection of 1500 psi to either side of diaphragm. 2. Secondary — transmits proportional output air pressure and incorporates pneumatic force-balance transmitting system.



Electric Timer

X-17 PHOTOSWITCH INCORPORATED, 77 Broadway, Cambridge 42, Mass., has introduced the Electronic Timer 30HL1, for process control machine timing and other industrial applications.

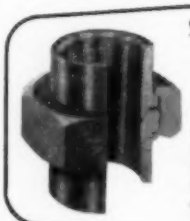
The timer is designed for intervals from 1/20 second to four minutes. The

Four types of timing in Photoswitch's new unit—interval, delayed action, automatic repeat, and programming.

Catawissa PERFECT SEAL Unions

HOT FORGED from solid, rectangular steel bars, designed and produced for dependable, long-life service under the severest piping conditions!

A TYPE FOR EVERY USE!
FOR ALL PRESSURES!
FOR ALL TEMPERATURES!



Standard & Double Extra Heavy UNIONS

Available with screwed or socket weld ends. 3000-lb. sizes 1/8" to 3"; 6000-lb. sizes 1/8" to 2".

ORIFICE UNIONS

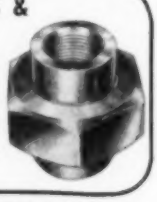
With screwed or socket weld ends. 3000-lb. and 6000-lb. service.

MALE & FEMALE UNIONS

With steel-to-steel, bronze-to-steel, stainless steel-to-steel or orifice seats. 3000-lb. service only.

FULL STAINLESS & FULL ALLOY STEEL UNIONS

With screwed or socket weld ends. 3000-lb. and 8000-lb. service.



WRITE FOR CATALOG 11

showing the complete Catawissa line of Perfect Seal products

CATAWISSA VALVE & FITTINGS COMPANY

950 MILL ST. • CATAWISSA, PA.

electrical circuit of the timer has many exclusive features. Foremost is the flexibility of the entire unit which provides in a single timer the four fundamental types of timing.

The basic electronic circuit is self-compensating for changes in line voltage and, for this reason, accuracy does not vary from day to day, nor will replacement of the electron tube alter the original 2 per cent limit of accuracy. Even low line voltages do not affect the timer's operation. The device employs only one electron tube and one relay.

Glass Block Overcomes Common Skylight Problems

X-18 PITTSBURGH CORNING CORPORATION, 307 Fourth Ave., Pittsburgh 22, Pa., announces its new "Skytrol" Glass Block, specially designed for use in skylights, both structurally and optically.

The design and daylighting advantages of skylights have been recognized for hundreds of years. However, problems of condensation, glare, heat gain and loss have been a serious stumbling block to the popularity of skylights. The new skylight block was designed to overcome these problems.

This glass block is a 12 in. x 12 in. square, 4 in. thick. The normally good insulating value of the glass block has been increased by the addition of a fibrous glass screen sealed in the block, creating a double cavity. This screen offers better daylighting control by diffusing the light. The screen in addition to the skylight block's internal prisms and Soft-Lite Edge assure evenly diffused daylight from a panel of uniform illumination.

Pumping Quality-
into
Fine Paper

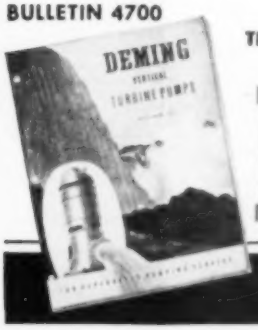
"Fine Paper at its Best" is the famous slogan of the Rising Paper Company, Housatonic, Massachusetts. The first "must" in the manufacture of Rising Papers is pure, crystal clear water.

It takes a lot of water—100 gallons —to make a pound of paper. At the Rising Paper Company, millions of gallons of crystal clear water are pumped from an 8-inch well, 600 feet deep at the rate of 550 gallons per minute against a head of 110 feet.

This service is performed by the Deming Vertical Turbine Pump illustrated. Installed in 1940 by the Artesian Well Supply Co., Providence, R. I., the Deming Turbine Pump is "very satisfactory," according to Mr. F. E. May, President, Rising Paper Co.

Investigate the advantages of Deming Vertical Turbine Pumps. Write for Bulletin 4700.

BULLETIN 4700

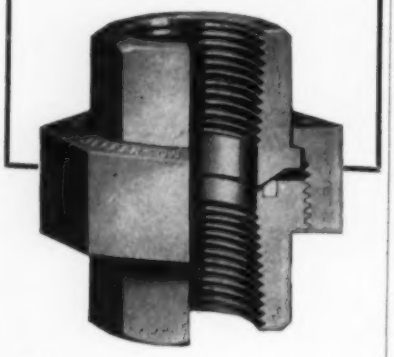


THE DEMING COMPANY • 549 Broadway, Salem, Ohio

Deming
PUMPS

Jefferson

300 LB. UNIONS



These

4 FEATURES

contribute to long, care-free, economical service:

1. Made of Air Furnace, Malleable Iron (55,000 p.s.i. tensile strength).
2. Air Tested Before Shipment.
3. Providing a Ball Joint of True Spherical Contour.
4. Offering a Performance-Proved Recessed Brass Seat of Exclusive Design.

All Jefferson "300 Lb." Unions are plainly so marked . . . a "cast-in-metal" hall-mark of high quality . . . for your protection and assurance of long, dependable service.

To take advantage of all these features is to get the highest return on your pipe union dollar and lowest cost per year of service.

Jefferson offers OWG 2000# to 2" and 1000# up to 4". The complete line includes AAR male and female unions, Euduro 300#, Excel 250# and Master 150# unions. All types are also available with all-iron seats. Underwriters approved.

Get in touch with your nearest distributor or with us direct for your requirements.

JEFFERSON UNION CO.

650 W. 26th St., New York 1, N. Y.
79 Gooding St., Lockport, N. Y.
49 Fletcher Ave., Lexington 73, Mass.

WHAT'S NEW and Where to Get It

Free literature on the latest developments in equipment and supplies is offered by leading manufacturers. For your copy, circle the item number on one of the reader service post cards provided on pages 17 and 18.

P-1 **ELECTRICAL CONNECTORS**—Catalog, 8 pages—New line of electrical splicing connectors, terminal lugs, rubber and Neoprene insulating sleeves, and crimping tools under the name of "Insul-Lock." Feature of line is a light weight mechanical type portable hand crimping tool, which crimps wire and cable without application of heat. Chart gives pictures and specifications for selection of proper tool for each job.—F. M. ANTHONY CO., 2022 Oakland Ave., Piedmont 11, Calif.

P-2 **MATERIALS HANDLING**—File Folder, "Engineered Applications"—Illustrated set of case studies featuring MonoRail materials handling applications in all types of industry. Track, cranes, and auxiliary equipment are included.—THE AMERICAN MONORAIL COMPANY, 13107 Athens Ave., Cleveland 7, Ohio.

P-3 **LIQUID PROCESSING EQUIPMENT**—Bulletin No. C-652, 12 pages—Illustrates and describes complete line of tanks, mixers, filters and pumps for production of liquid chemicals, drugs, extracts, liquid soaps, syrups, acids, oils, and plating solutions. Contains equipment photographs, line drawings, and tables of dimensions and construction.—ALSOP ENGINEERING CORPORATION, 7062 Dickson St., Milldale, Conn.

P-4 **HYDRAULIC OIL CYLINDERS**—Bulletin No. FM-1, 4 pages—Illustrates and describes heavy duty, simplified design, hydraulic oil cylinders designed especially for use in 2000 psi hydraulic systems. Table shows dimensions for cylinder mountings.—FISHBURNE MACHINE COMPANY, P. O. Box 6006, Asheville, N. C.

P-5 **BLOWDOWN VALVE**—Catalog, 8 pages—Explains automatic blowdown control with Rice intermittent blowdown valve. Gives case history of the valve in operation in a large steel mill with contaminated feedwater supply. Illustrated.—RICE INDUSTRIES, 24 Clearview Drive, Pittsburgh 5 (Greentree), Pa.

P-6 **INDUSTRIAL POWER DISTRIBUTION**—"Idea Book" GEA-5900, 28 pages—Covers utility distribution practices; methods of buying electric power; choice of primary voltages; application of primary switches and circuit breakers; types and arrangements of primary cables; types of load-center distribution systems. Illustrated.—GENERAL ELECTRIC COMPANY, Schenectady 5, N. Y.

P-7 **MOTOR CONTROLS**—Bulletin, 28 pages—"Quality Line of Motor Controls for All Industries" covers controls, starters, and accessories, and lists applications for the apparatus. Illustrated with photographs.—THE ALLEN-BRADLEY COMPANY, 118 W. Greenfield Ave., Milwaukee 4, Wis.

P-8 **CENTRIFUGAL PUMPS**—Bulletin 524M, 2 pages—Illustrates and describes the Model 4M "fly-weight" centrifugal pump, 1½ in. size, 4000 gph, designed for heavy duty service in a variety of industrial uses. Discusses automatic priming, built-in suction check valve, bellows-type cartridge shaft seal, direct line flow, non-clogging impeller, and other design features.—RICE PUMP & MACHINE COMPANY, Grafton, Wis.

P-9 **CORROSION - PROOF TUBING**—Bulletin L-6506, 4 pages—Describes several kinds of corrosion-proof Dekoron instrument tubing: single-line metal tubing with plastic sheath; multiple metal harness with polyethylene coating; multiple polyethylene tube harness with vinyl sheath. Contains photographs of actual tubing installations.—SAMUEL MOORE & COMPANY, Dekoron Tubing Division, Mantua, Ohio.

P-10 **BELT CONVEYOR**—Specifications and Data, Bulletin No. FV-53, 4 pages—Gives photographs and descriptions of typical uses of the Floor-Veyor belt conveyor, which is used to move goods from floor to floor or horizontally in many types of industry. Includes specifications and installational data.—THE RAPIDS-STANDARD COMPANY, INC., 342 Rapistan Bldg., Dept. FV-53, Grand Rapids 2, Mich.

P-11 **ELECTRICAL CONNECTIONS**—Booklet, 12 pages—"Instructions for Applying Rapid High Speed Silver on Electrical Work" explains preparation and application of product on all types of electrical connections or joints, including aluminum. Price list is included. Illustrated.—RAPID ELETROPLATING PROCESS, INC., 1414 S. Wabash Ave., Chicago 5, Ill.

P-12 **VALVES**—Circular No. 582, 4 pages—Describes and illustrates design and construction of line of 125 lb. pressure globe, angle and check bronze valves. Contains sectional views and tables of dimensions.—THE LUNKENHEIMER COMPANY, Box 360U, Cincinnati 14, Ohio.

P-13 **SOOT BLOWERS**—Bulletin 1004, 32 pages—Discusses 15 central station installations of Vulcan Automatic-Sequential Soot Blower systems, including power and reheat boilers with capacities to 1,370,000 lb/hr, pressures to 1925 psi and temperatures to 1055 F, driven by air or electric motor.—COPES-VULCAN DIVISION, CONTINENTAL FOUNDRY & MACHINE COMPANY, Erie 4, Pa.

P-14 **LIQUID LEVEL GAGES**—Unit No. 184, 4 pages—Illustrates and describes Jerguson Reflex Type liquid level gages for indicating the liquid level in tanks, boilers, stills, or any liquid containing vessel. Discusses design, construction, and application.—JERGUSON GAGE & VALVE COMPANY, 80 Fellsway, Somerville 45, Mass.

P-15 **JET CLEANING**—Bulletin No. 70, 4 pages—Describes two types of jet cleaning equipment: the Steam-Jet Cleaner, and the Hydrajet, each designed to meet specific need for a specialized field, with selection depending upon applications and operating conditions. Includes equipment and installational photographs.—LIVINGSTONE ENGINEERING COMPANY, 100 Grove St., Worcester 5, Mass.

P-16 **AIR CONTROL VALVES**—Bulletin No. 101A, 12 pages—Explains characteristics and advantages of air power and describes three fundamental types of air control valves, including remote controlled, integral pilot operated, and direct operated. Includes flow diagrams and photographs.—ROSS OPERATING VALVE COMPANY, 120 E. Golden Gate Ave., Detroit 3, Mich.

P-17 **RUBBERIZED ABRASIVES**—Catalog No. 53, 8 pages—Discusses rubberized abrasives on burring, smoothing and polishing operations, and industrial uses. De-

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scribes wheels, points, blocks, sticks, and cones available for machine or manual application. Illustrated. Price list included. —CRATEX MANUFACTURING COMPANY, 81 Natoma St., San Francisco 5, Calif.

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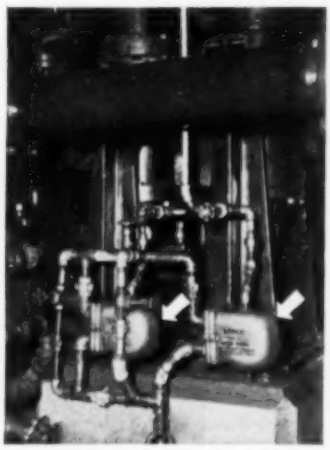

Water accumulating in compressed air systems must be drained off promptly to prevent damage to tools, marred paint surfaces or wetting of material to be cleaned—especially electrical machines.

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Waste Control

(*Continued from page 92*)

ticipation stimulates worker interest.

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A power engineer will be required in the investigation of utilities; industrial engineers in methods; purchasing in material control; inspection in quality control; and engineering and mechanical in the salvage operations.

Obviously, waste control techniques require company wide interest and cooperation. But an effective program will pay big dividends.

Fuse Tips

(*Continued from page 97*)

surface and oxidize it) or, in the case of plug fuses, burned metal center contact.

Installational Data

When replacing blown fuse links, be sure to use the proper capacity links, and to brighten the contacting surfaces of both the link and the fuse terminals on which the link seats with emery cloth if they are oxidized. Carefully seat end washers on smaller size fuses and screw down the end caps as tightly as possible. Avoid the use of pliers on end caps as they will damage the contact surface.

On larger sizes of fuses, place the link directly on the copper terminals and pull the bolts up very tight with wrenches or a wrench and a vise. Tighten the end caps securely so that pressure will be retained inside the case to extinguish the arc. Always use only one link, of the proper carrying capacity. The use of two or more smaller capacity links to total the fuse capacity may prevent the fuse from carrying its full capacity.

In replacing fuses, if possible, have the circuit dead, otherwise an arc may form and roughen the fuse terminals or the fuse clips, thus preventing good contact. See that the clips and fuse terminals are clean and bright. If not, polish them with emery cloth. Clips that are in satisfactory condition should noticeably grip the fuse terminals.

Plug type fuse and fuse holder contact surfaces should likewise be smooth, clean and bright, and the fuse should be tightened securely.

Sometimes the current conducting parts of fuse holders, or the wire terminals connected to them, will loosen and develop poor contact. If this condition is not quickly remedied, burning of parts and overheating will result and needless blowing of fuses will occur.

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Electrical Q & A

(*Continued from page* 86)

control is well adapted to the slip ring motor because it is already equipped with a starting resistance in each phase of the rotor circuit. By making these resistances of large enough current capacity to prevent dangerous heating in continuous service the same resistances serve also for reducing the speed. A maximum reduction of 50 per cent from normal speed can be obtained in this manner. Such speed control is advantageous for many purposes, such as in driving fans, centrifugal pumps, elevators, cranes, hoists and conveyors.

Q—What starting and controlling equipment is used with a slip ring motor?

A—A resistance type starter is used. This has a resistance that may be cut out in steps in starting and may be short-circuited when the motor is operated at full speed. A switch must also be used for connecting the stator to the line. Overload and low voltage protective devices are usually provided with this switch.

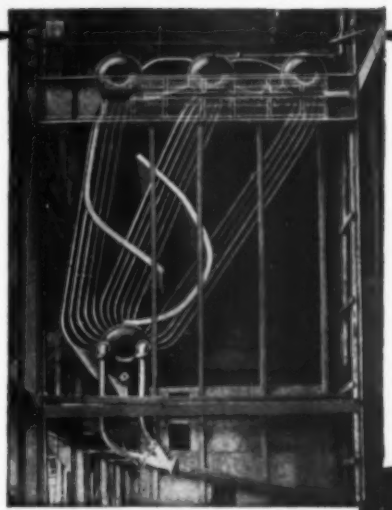
When the starter is also to be used for speed control, it is especially constructed for this purpose.

Q—What is a multi-speed motor?

A—The stator windings of an induction motor are grouped so as to produce an even number of poles, which number remains fixed in the ordinary types of motors. The speed depends on the number of poles and the frequency of the power circuit. Thus, if the number of poles could be doubled, the speed would be reduced one-half. By proper design of the stator windings, extra leads can be brought out so that the number of poles can be changed in a two to one ratio, by a simple switching arrangement of connections. If more than two speeds are desired or if the two speeds do not have a ratio of two to one, it is the usual practice to wind the stator with two or more separate windings, each of which may have two speed connections.

(*Continued on page* 138)

MORE STEAM



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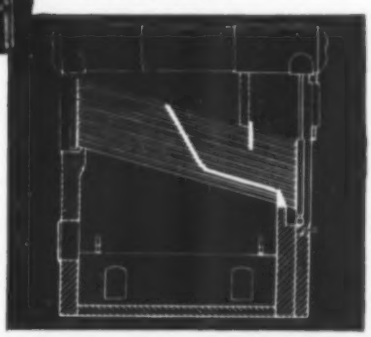
Steam output can be boosted quickly and easily by installing Enco baffles. These streamlined baffles prevent eddy currents and dead gas pockets. The cross-flow puts every square foot of heating surface to work.



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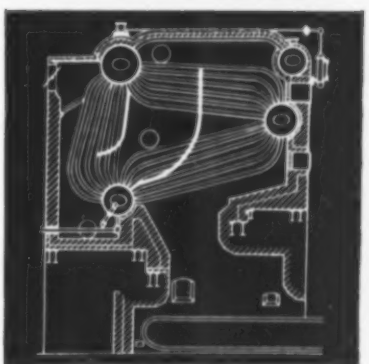

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THE ENGINEER COMPANY

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Enco Streamline Baffles

PRODUCED EXCLUSIVELY BY THE ENGINEER COMPANY

Q—What are the classes of multi-speed motors?

A—Multi-speed motors are classified into three groups according to output.

(1) Variable torque multi-speed motors.

The horsepower output of this type of motor varies as the square of the speed. In other words, if we assume a two speed motor rated 10 hp at 1,800 rpm on the high speed, it will have a horsepower rating of 2½ hp at 900 rpm. While the speed was reduced by one-half, the horsepower is only one-quarter of the horsepower at the high speeds. Motors of this type are used on loads that vary as the square or cube of the speed, such as fans, centrifugal pumps, etc.

(2) Constant torque multi-speed motors.

The horsepower output of this type of motor varies directly as the speed. Assuming a two speed motor rated 10 hp at 1,800 rpm on the high speed, it will be rated 5 hp at 900 rpm.

(3) Constant horsepower multi-speed motors.

The horsepower output of this type of motor is the same for all speeds.

Vertical Stacking

(*Continued from page* 75)

which are handled by Transporter-type, driver-led electric trucks.

Two operations—finishing bags which call for sewing, and those which call for pasting—introduce handling complications because work volume is erratic. In general, Bemis says, it is a Transporter operation, with skid loads of bags averaging 3,600 lb.

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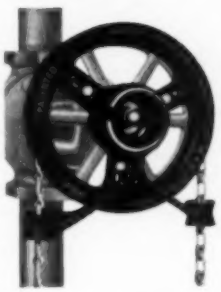

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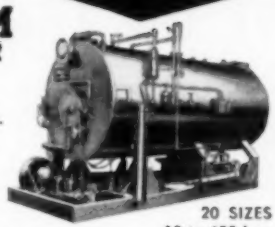

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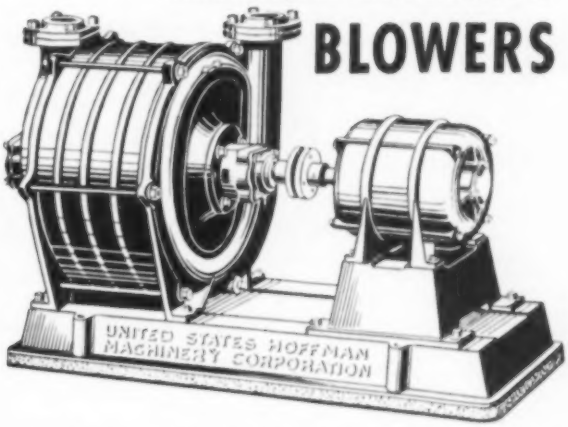

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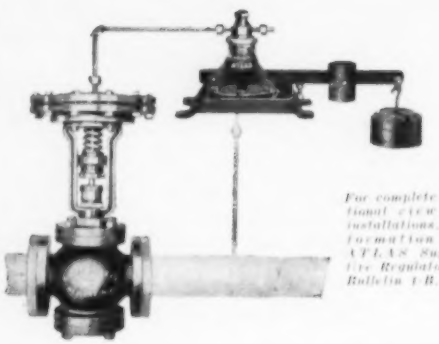

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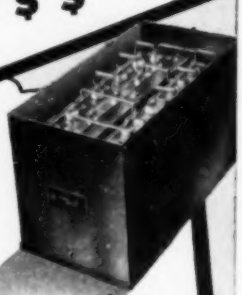

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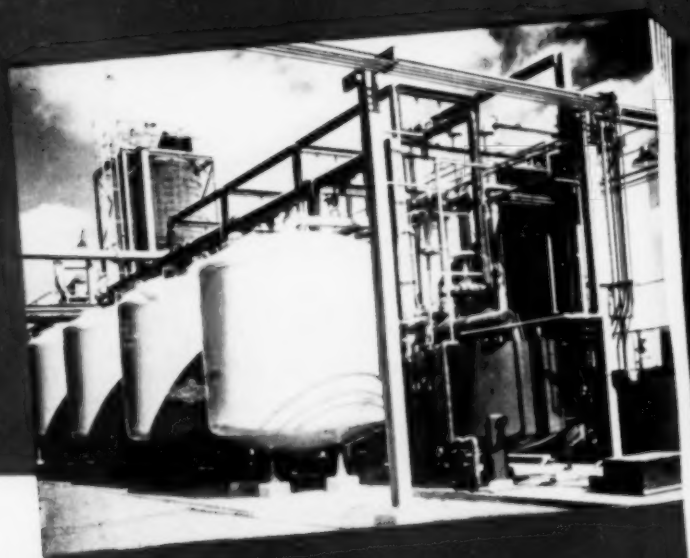

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